PB-229 587

NATIONAL EMISSION STANDARDS STUDY REPORT. APPENDIX - VOLUME 3. APPENDIX F (PART 2)

National Air Pollution Control Administration
Washington, D. C.

March 1970

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PB 229 587

NATIONAL EMISSION STANDARDS STUDY

Report

Appendix-Volume 3

Appendix F (Part 2)

A Report To The Congress of The United States
By The Secretary of Health, Education, And Welfare
In Compliance With
Public Law 90-148
Clean Air Act, As Amended

March 1970

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Environmental Health Service
National Air Pollution Control Administration

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Springfield VA 22151

APPENDIX F

MAJOR STATIONARY SOURCES OF AIR POLLUTION AND THEIR CHARACTERISTICS

(CONTINUED)

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F.11 Nonferrous Metallurgical Operations

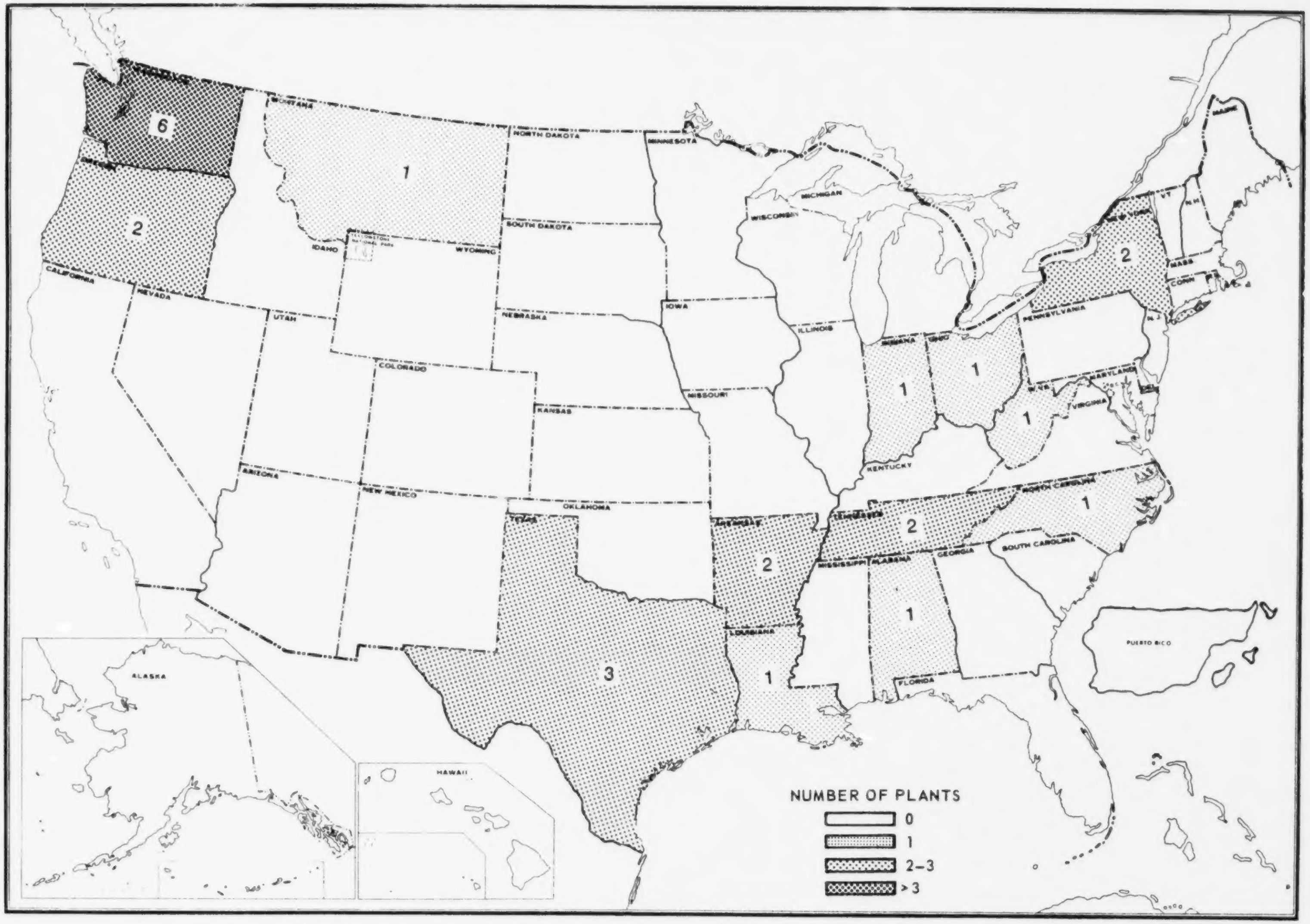
Aluminum and copper, in their alloys, are economically competitive in many electrical, structural, and decorative applications. Lead and zinc, also leading industrial metals, are closely related to copper in the process of smelting. Within the nonferrous classification, the following industries are discussed: aluminum reduction (primary) and copper, lead, and zinc smelting (primary and secondary).

F.11.1 Primary Aluminum Reduction

The growth of the primary aluminum industry has been so rapid that the annual production is greater than that for any other nonferrous metal. Aluminum is produced by a two-step process: pure alumina is produced from bauxite ore by the Bayer process, and this alumina is reduced to metallic aluminum by the Hall-Heroult process.

In the Hall-Heroult process, alumina is reduced electrolytically to metallic aluminum. More specifically, the alumina is dissolved in an electrolyte (cell or pot) of molten cryolite and other fluoride salts. There are three different types of pots--the prebaked or multianode (Niagara), the horizontal spike Soderberg (HSS), and the vertical spike Soderberg (VSS); the Soderberg types are continuous anode cells.

There were 24 primary aluminum reduction plants in the United States(25) (see table F-14) with a total capacity of 3.543 million tons at the end of 1968.(25) Figure F-11 shows the geographical distribution of primary aluminum reduction plants; one-third of the plants are within SMSA's. An additional 6 companies are constructing plants that will have capacities of 240,000 tons by 1970, 532,000 tons by 1971, and 657,000 tons by 1972.


NUMBER OF PLANTS
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2–3
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6
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2
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2
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2
MONTANA
NORTH DAKOTA
MINNESOTA
SOUTH DAKOTA
WYOMING
IDAHO
CALIFORNIA
NEVADA
UTAH
NEBRASKA
IOWA
ILLINOIS
WISCONSIN
MICHIGAN
COLORADO
KANSAS
MISSOURI
KENTUCKY
ARIZONA
NEW MEXICO
OKLAHOMA
TEXAS
LOUISIANA
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
MARYLAND
PENNSYLVANIA
NEW YORK
INDIANA
OHIO
VT
N.H.
MASS
CONN
N.J.
MAINE
ALASKA
HAWAII
PUERTO RICO

Figure F-11. Primary aluminum reduction plants, 1968.

The principal sources of air pollution in aluminum plants are the pots and the anode baking ovens. The effluent released during the pot reduction process contains hydrogen fluoride and fluoride fumes. Carbon oxides, sulfur dioxide, and particulate matter such as alumina, carbon, and small amounts of fluorides are also contained in the exhaust gases. In addition, the effluent from Soderberg cells contains high molecular weight hydrocarbon tars.

The emissions from the more common prebaked cells contain little or no tars. Control of these emissions is a matter of collecting considerable quantities of medium-to-fine material, furnace dust, and fluorine compounds released from the pots. The gaseous fluoride compounds are highly water soluble and do not present too difficult a scrubbing problem when alkaline scrubbing water is used; the fluoride fume (particulates) from prebaked cells can be removed effectively with fabric filters and other high efficiency collection systems.

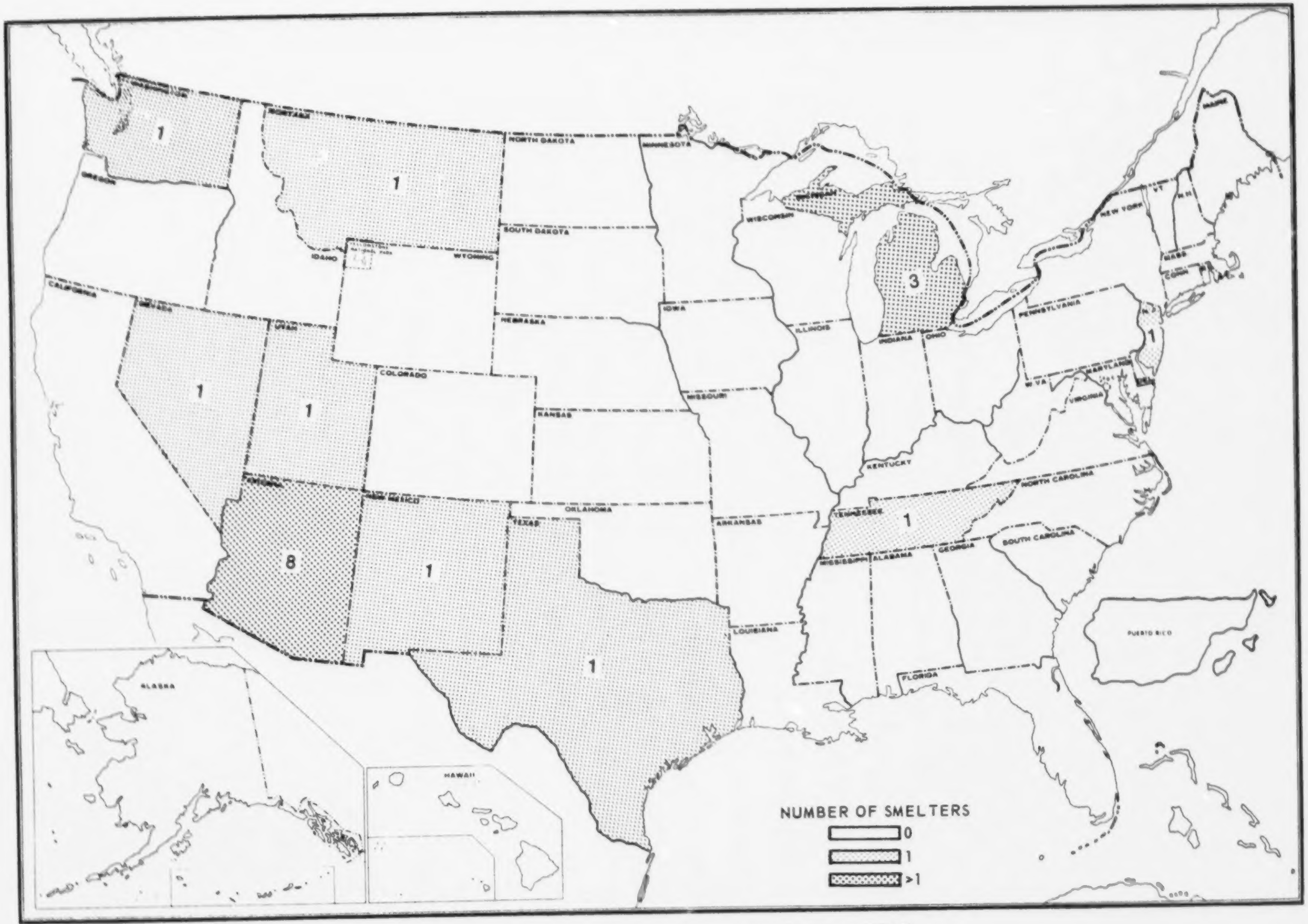
Collections of the emissions from the Soderberg pots are complicated by the release of large quantities of tarry matter. In the VSS cell, a gas-collecting manifold is an integral part of the electrode and a burner is attached to this manifold to consume the sticky tars and other volatile materials; the remaining dust is treated by scrubbers, by fabric filters with lime or activated alumina coating, or by electrostatic precipitators. There is a tendency for tar fouling in fabric filters and precipitators handling these emissions. In the HSS cell, the design of the pots requires large amounts of diluting air which increases the difficulty of collection at the pots. One type of floating-bed scrubber, however, has been used successfully; its self-cleaning feature overcomes the tar-fouling problem and offers 95 percent removal of gaseous fluorides and up to 99 percent removal of solids.(26) Cell-building ventilation air contains appreciable amounts of fluoride; thus in one or two instances, this air is passed through central scrubbing devices before being exhausted.

No actual data on fluoride emissions are available, but an estimated 20 pounds of gaseous hydrogen fluoride and 60 pounds of fluoride fume (containing 20 percent fluorine) are emitted per ton of aluminum produced from an uncontrolled process.(27)

F.11.2 Copper, Lead, and Zinc Smelting, Primary and Secondary

F.11.2.1 Copper (Primary)

The United States has been the world's largest producer of copper since 1883 with the exception of one year. The copper is primarily derived from low grade sulfide ores, which are concentrated by gravity and flotation and which may be roasted in multiple hearth furnaces before charging into the smelter. The roasting process removes sulfur and preheats the charge; the smelting process in large reverberatory furnaces converts calcines, or wet concentrates, to cuprous sulfide and removes other impurities as slag. Copper matte, a mixture of cuprous and ferrous sulfides, is tapped into ladles and transferred to converters where it is blown with thin streams of air to remove the sulfur as sulfur dioxide; iron and other impurities are removed as slag. The crude copper is further refined in a series of steps culminating with an electrolytic process.



NUMBER OF SMELTERS
0
1
>1
1
1
1
1
8
1
1
3
1
1
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
COLORADO
WYOMING
IDAHO
UTAH
NEW MEXICO
CALIFORNIA
OREGON
MINNESOTA
IOWA
MISSOURI
ARKANSAS
LOUISIANA
WISCONSIN
ILLINOIS
INDIANA
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KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
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SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
W VA
MARYLAND
PENNSYLVANIA
NEW YORK
VT
N.H.
MASS
CONN
MAINE
PUERTO RICO
ALASKA
HAWAII

Figure F-12. Primary copper smelters, 1967.

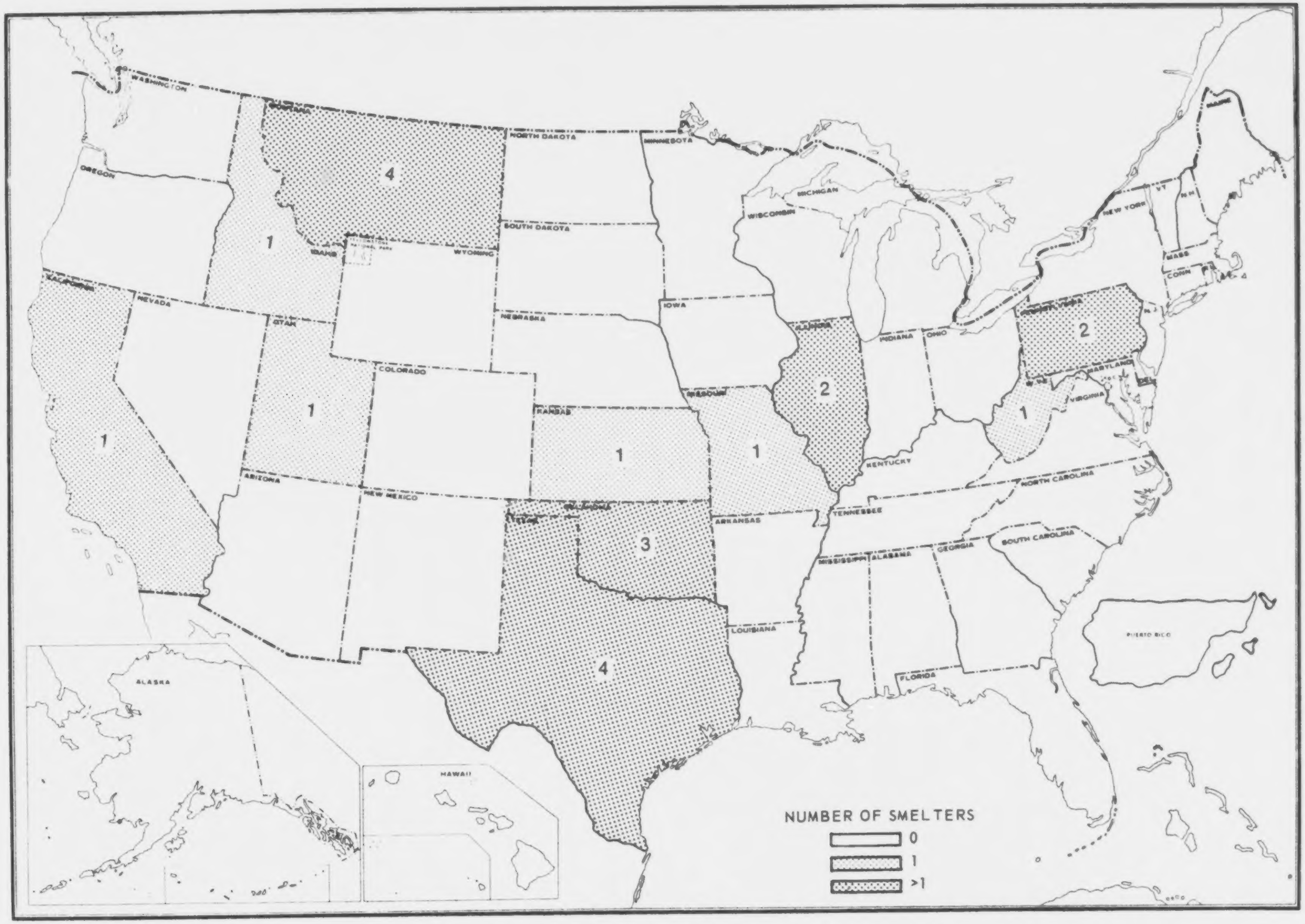
Of 19 primary copper smelters, 8 are in Arizona. Except for several in Michigan, New Jersey, and Tennessee, smelting sites are in the western portion of the country from Texas to Washington(28) (see table F-15). Geographical distribution is shown in figure F-12; four smelters are within SMSA's. Output of primary copper in 1966 was 1,581,107 tons.(29)

F.11.2.2 Lead and Zinc (Primary)

Lead concentrate is obtained by selective flotation from ore which contains both lead and zinc. A sintering operation eliminates most of the sulfur prior to smelting. A mixture of sinter, iron, coke, and fluxes is charged into blast furnaces; air is blown through the charge to burn the coke to carbon monoxide and carbon dioxide; carbon monoxide and solid carbon reduce the oxidized lead compounds to molten lead which is tapped off intermittently or continuously. The lead may be further refined by a variety of processes.

The slag from the lead smelting is an important source of zinc. Zinc is recovered by heating the slag and blowing air and pulverized coal through it; the resultant zinc oxide is collected in fabric filter units. Zinc ores, following concentration, are roasted to remove the sulfur as sulfur dioxide. Metallic zinc is produced from the roasted ore by retort and electrolytic processes or by fractional distillation.

There are some 21 primary zinc and lead smelters or roasters in 11 States(30) (see table F-16). The map in figure F-13 depicts their geograpnical distribution; 8 sites are within SMSA's. Capacity in 1967


WASHINGTON
MONTANA
4
NORTH DAKOTA
MINNESOTA
OREGON
IDAHO
1
SOUTH DAKOTA
WYOMING
WISCONSIN
MICHIGAN
NEW YORK
VT
N.H.
MASS
CONN
CALIFORNIA
NEVADA
UTAH
NEBRASKA
IOWA
ILLINOIS
INDIANA
OHIO
PENNSYLVANIA
2
1
COLORADO
KANSAS
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MISSOURI
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2
W. VA
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MARYLAND
VIRGINIA
KENTUCKY
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ARIZONA
NEW MEXICO
OKLAHOMA
3
ARKANSAS
TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
MISSISSIPPI
ALABAMA
GEORGIA
TEXAS
4
LOUISIANA
FLORIDA
PUERTO RICO
ALASKA
HAWAII
NUMBER OF SMELTERS
0
1
>1

Figure F-13. Primary lead and zinc smelters, 1966.

amounted to 1,294,200 tons of zinc slab; lead smelter production, including some secondary, totaled 401,151 tons.(28)

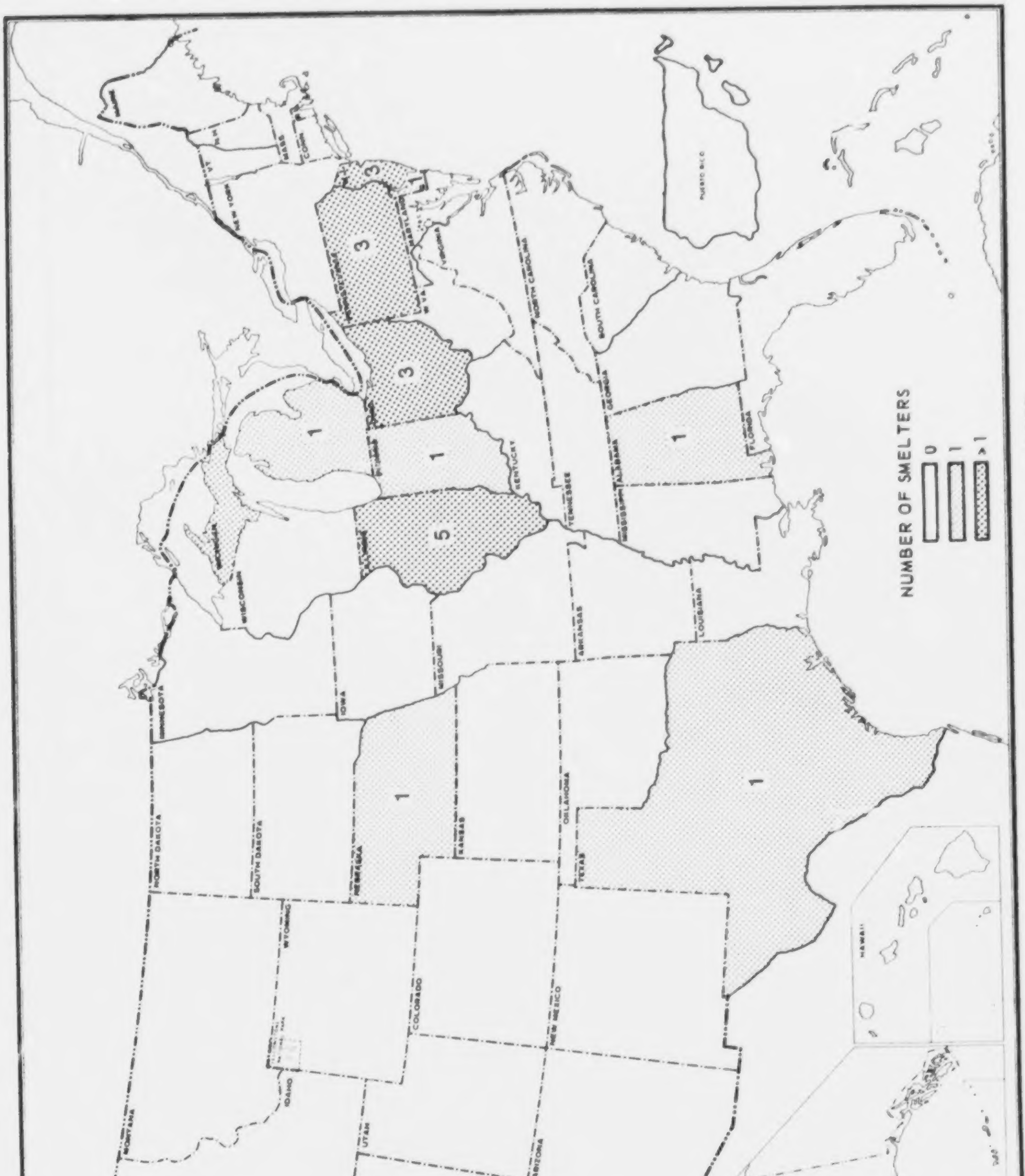
F.11.2.3 Copper, Lead, and Zinc (Secondary)

Scrap and salvage are the raw materials of the secondary metals industry. Copper, for example, is recovered from electric cables and automobile radiators; a substantial quantity of lead is recovered from automobile batteries; zinc scrap is also reprocessed.

Secondary copper, lead, and zinc operations total 96(31) (see tables F-17, F-18, F-19). Plants are distributed in 27 States as shown in figures F-14, F-15, and F-16; 94 percent are within SMSA's. Output in 1967 was 1,145,000 tons of secondary copper,(32) 73,000 tons of secondary zinc;(29) in 1966, secondary lead production was 553,072 tons.(28)

Principal pollutants from smelting and attendant operations are particulates and sulfur oxides. Particulates consist of smoke, dust, and metallic fumes (small particles); the metallics may be elemental, or they may be compounds of copper, lead, zinc, arsenic, antimony, and other trace substances. Inertial and gravity type collectors are used for removal of large particles; fabric filters and electrostatic precipitators are used to remove finer particulates.

Emissions from primary smelters are particularly significant. As opposed to the small sulfur oxide concentrations in effluents from coal/oil fired power plants, these effluents represent highly concentrated sources of sulfur oxide pollutants, which are potentially recoverable as sulfuric acid. In 1968, sulfuric acid capacity (that using smelter gas) was approximately 4,000,000 tons of 100 percent acid, representing about 14 percent of total production.(33)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OREGON
CALIFORNIA
NEVADA
IDAHO
MONTANA
UTAH
ARIZONA
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ALASKA

Figure F-14. Major secondary copper smelters, 1963.

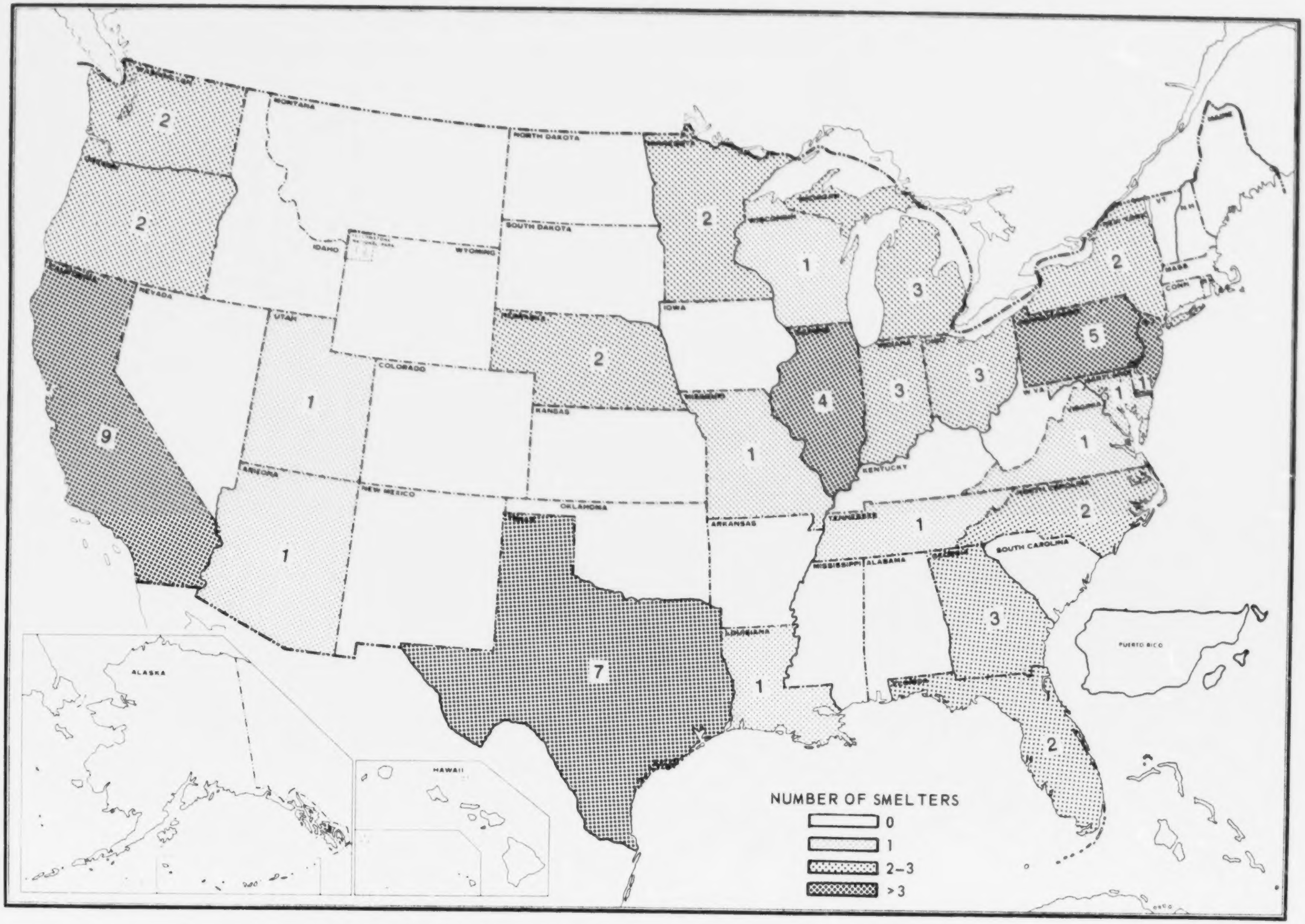
NUMBER OF SMELTERS
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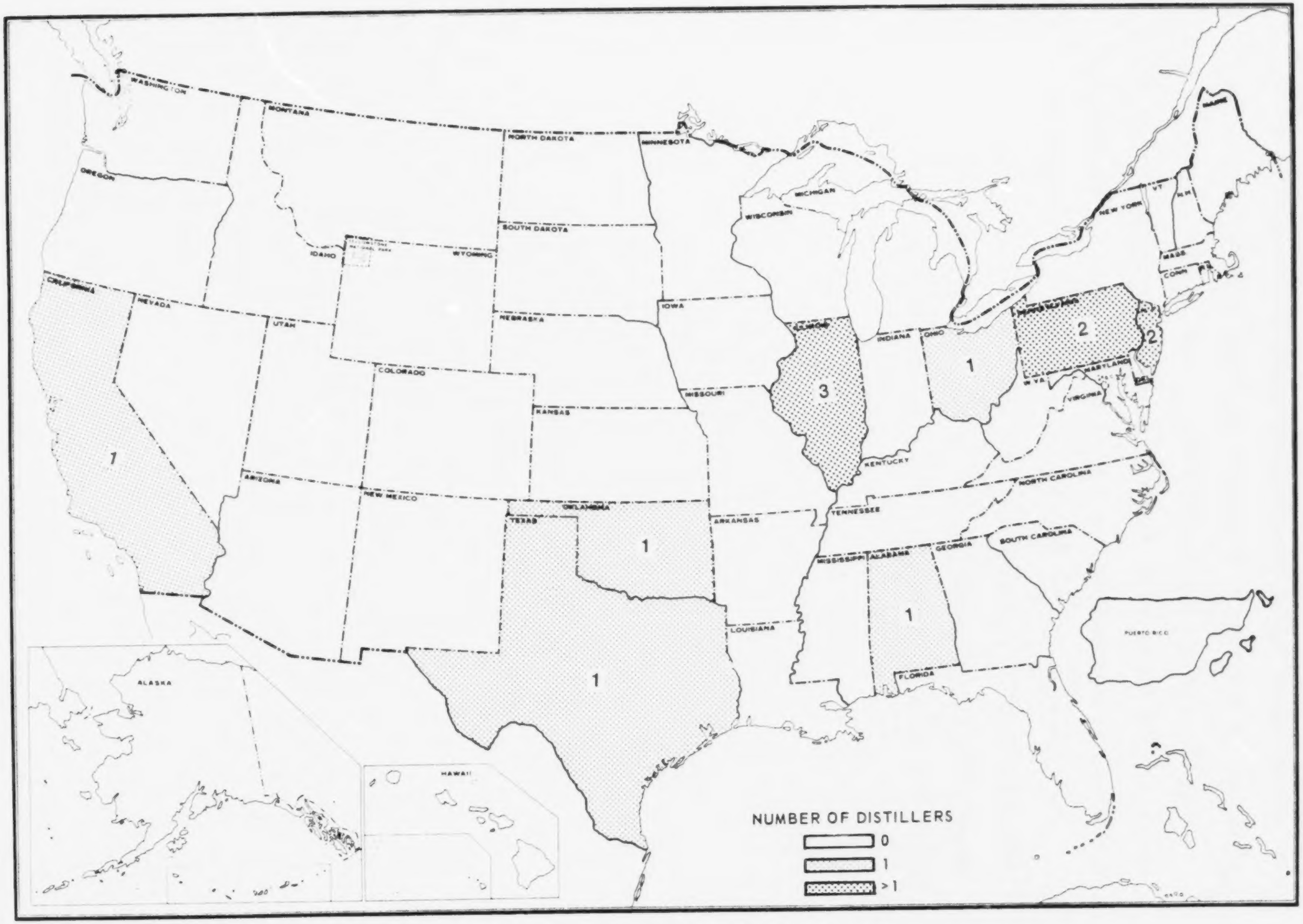
Figure F-15. Secondary lead smelters and refineries, 1967.



WASHINGTON
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HAWAII
1
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1
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3
1
2
2
NUMBER OF DISTILLERS
0
1
>1

Figure F-16. Secondary zinc distillers, 1967.

Conversion of sulfur (otherwise wasted to the atmosphere as a pollutant) to an economic advantage is desirable to conserve resources, but many factors are present which limit its application. Some plants use tall stacks to disperse the effluent; others curtail production during adverse meteorological conditions to limit ambient concentrations.

The principal emission from the secondary copper, lead, and zinc industries is particulates--smoke, dust, and metallic fumes. Small amounts of sulfur oxide may also be evolved. Electrostatic precipitators and fabric filters are necessary for collection of the particulates.

Table F-14. ALUMINUM REDUCTION PLANTS (PRIMARY)
July 15, 1968

State City	SMSA	Company	Capacity, Tons per Year
ALABAMA			
Sheffield	--	Reynolds	221,000
ARKANSAS			
Arkadelphia	--	Reynolds	63,000
Jones Mills	--	Reynolds	122,000
INDIANA			
Evansville	Evansville	Alcoa	175,000
LOUISIANA			
Chalmette	New Orleans	Kaiser	260,000
MONTANA			
Columbia Falls	--	Anaconda	175,000
NEW YORK			
Massena	--	Alcoa	125,000
Massena	--	Reynolds	128,000
NORTH CAROLINA			
Badin	--	Alcoa	100,000
OHIO			
Hannibal	--	Ormet	240,000
OREGON			
The Dalles	--	Harvey	88,000
Troutdale	Portland	Reynolds	100,000

State City	SMSA	Company	Capacity, Tons per Year
TENNESSEE			
Alcoa	Knoxville	Alcoa	125,000
New Johnsonville	--	Conalco	140,000
TEXAS			
Corpus Christi	Corpus Christi	Reynolds	111,000
Point Comfort	--	Alcoa	175,000
Rockdale	--	Alcoa	175,000
WASHINGTON			
Ferndale	--	Intalco	245,000
Longview	--	Reynolds	70,000
Mead	Spokane	Kaiser	206,000
Tacoma	Tacoma	Kaiser	61,000
Vancouver	Portland	Alcoa	100,000
Wenatchee	--	Alcoa	175,000
WEST VIRGINIA			
Ravenswood	--	Kaiser	163,000

Table F-15. COPPER SMELTERS (PRIMARY)
1967

State City	SMSA	Company	Material, Tons per Year
ARIZONA			
Ajo	Tucson	Phelps Dodge Corp.	300,000
Douglas	--	Phelps Dodge Corp.	1,250,000
Hayden	--	American Smelting & Refining Co.	420,000
Hayden	--	Kennecott Copper Corp.	420,000
Miami	--	Inspiration Consolidated Copper Co.	450,000
Morenci	--	Phelps Dodge Corp.	900,000
San Manuel	--	Magma Copper Co.	403,000
Superior	--	Magma Copper Co.	150,000
MICHIGAN			
Hancock	--	Quincy Mining Co.	12,000
Hubbell	--	Calumet & Hecla, Inc.	30,000
White Pine	--	White Pine Copper Co.	90,000
MONTANA			
Anaconda	--	Anaconda Co.	1,000,000
NEW MEXICO			
Hurley	--	Kennecott Copper Corp.	400,000
NEVADA			
McGill	--	Kennecott Copper Corp.	400,000
NEW JERSEY			
Carteret	--	American Metal Climax, Inc.	180,000

State City	SMSA	Company	Material, Tons per Year
TENNESSEE			
Copperhill	--	Tennessee Corp. Tennessee Copper Co.	90,000
TEXAS			
El Paso	El Paso	American Smelting & Refining Co.	420,000
UTAH			
Garfield	Salt Lake City	Kennecott Copper Corp.	1,000,000
WASHINGTON			
Tacoma	Tacoma	American Smelting & Refining Co.	600,000

Table F-16. LEAD AND ZINC SMELTERS OR ROASTERS (PRIMARY)
1968

State City	SMSA	Company	Tons per year concentrate, Zinc	Lead
CALIFORNIA				
Selby	San Francisco-Oakland	American Smelting & Refining Co.	-	-
IDAHO				
Kellogg	--	Bunker-Hill Co.	210,000	260,000
ILLINOIS				
Depue	--	New Jersey Zinc Co. (Gulf & Western Ind.)	72,000	-
Fairmount City	St. Louis	American Zinc Co.	75,000	-
KANSAS				
Galena	--	Eagle-Picher Company	-	-
MISSOURI				
Herculaneum	St. Louis	St. Joseph Lead Co.	-	194,000
MONTANA				
Anaconda	--	The Anaconda Co.	39,000	-
East Helena	--	The Anaconda Co.	-	-
East Helena	--	American Smelting & Refining Co.	-	91,000
Great Falls	Great Falls	The Anaconda Co.	345,000	-
OKLAHOMA				
Bartlesville	--	National Zinc Co.	80,000	-
Blackwell	--	American Metal Climax Co.	180,000	-
Henryetta	--	Eagle-Picher Industries	-	-

State City	SMSA	Company	Tons per year concentrate, Zinc	Lead
PENNSYLVANIA				
Josephtown	Pittsburgh	St. Joseph Lead Co.	370,000	-
Palmerton	--	New Jersey Zinc Co. (Gulf & Western Ind.)	192,000	
TEXAS				
Amarillo	Amarillo	American Smelting & Refining Co.	96,000	-
Corpus Christi	Corpus Christi	American Smelting & Refining Co.	-	-
Dumas	--	American Zinc Co.	112,000	-
El Paso	El Paso	American Smelting & Refining Co.	-	-
UTAH				
Tooele	--	International Smelting & Refining Co.	-	-
WEST VIRGINIA				
Meadowbrook	--	Mattheissen & Hegeler Co.	-	-

Table F-17. COPPER SMELTERS (MAJOR SECONDARY)
1963

State City	SMSA	Company
ALABAMA		
Fairfield	Birmingham	W. J. Bullock, Inc.
DELAWARE		
Wilmington	Wilmington	North American Smelting
ILLINOIS		
Chicago	Chicago	Elesco Smelting Corp.
Chicago	Chicago	R. Lavin & Sons, Inc.
Chicago	Chicago	Interstate Smelting & Refining Co.
Chicago	Chicago	Benjamin Harris & Co.
North Chicago	Chicago	North Chicago Refiners & Smelters
INDIANA		
Whiting	Gary-Hammond-East Chicago	Federated Metals Div., American Smelting & Refining Co.
MICHIGAN		
Grand Rapids	Grand Rapids	Liberman & Gittlen Metal Co.
NEBRASKA		
Lincoln	Lincoln	Northwestern Metal Co.
NEW JERSEY		
Newark	Newark	Barth Smelting & Refining Co.
Newark	Newark	Federated Metals Div., American Smelting & Refining Co.

State City	SMSA	Company
NEW JERSEY (cont.)		
Perth Amboy	--	Federated Metals Div., American Smelting & Refining Co.
OHIO		
Bedford	Cleveland	Federal Metal Co.
Bedford	Cleveland	I. Schumann & Co.
Cleveland	Cleveland	River Smelting & Refining Co.
PENNSYLVANIA		
Columbia	--	Colonial Metals Co.
Pittsburgh	Pittsburgh	Roessing Bronze Co.
Philadelphia	Philadelphia	H. Kramer & Co. (Ajax Metals Div.)
TEXAS		
Houston	Houston	Federated Metals Div., American Smelting & Refining Co.

Table F-18. LEAD SMELTERS AND REFINERIES (SECONDARY) 1967

State City	SMSA	Company
ARIZONA		
Phoenix	Phoenix	Morris P. Kirk & Son, Inc., (National Lead Co.)
CALIFORNIA		
City of Industry	Los Angeles-Long Beach	Western Lead Products Co.
Emeryville	San Francisco-Oakland	Morris P. Kirk & Son, Inc.
French Camp	Stockton	National Lead Co.
Fresno	Fresno	Morris P. Kirk & Son, Inc.
Gardena	Los Angeles-Long Beach	Alco Mining, Inc.
Los Angeles	Los Angeles-Long Beach	American Smelting & Refining Co.
Los Angeles	Los Angeles-Long Beach	Morris P. Kirk & Son, Inc.
Los Angeles	Los Angeles-Long Beach	National Lead Co.
San Francisco	San Francisco-Oakland	American Smelting & Refining Co.
DELAWARE		
Wilmington	Wilmington	North American Smelting Co.
FLORIDA		
Tampa	Tampa-St. Petersburg	Gulf Coast Lead Co.
Tampa	Tampa-St. Petersburg	Southeastern Lead, Div. of C. Graves, Inc.
GEORGIA		
Atlanta	Atlanta	National Lead Co.
Atlanta	Atlanta	Seitzinger's, Inc.
Columbus	Columbus	Southeastern Lead, Div. of C. Graves, Inc.

State City	SMSA	Company
ILLINOIS		
Chicago	Chicago	Goldsmith Bros., Div. Nat'l. Lead Co.
Chicago	Chicago	Inland Metals Refining Co.
Chicago	Chicago	National Lead Co.
Granite City	St. Louis	National Lead Co.
INDIANA		
East Chicago	Gary-Hammond-East Chicago	U.S.S. Lead Refinery, Inc.
Indianapolis	Indianapolis	National Lead Co.
Whiting	Gary-Hammond-East Chicago	American Smelting & Refining Co.
LOUISIANA		
Baton Rouge	Baton Rouge	Schuykill Products Co.
MARYLAND		
Baltimore	Baltimore	National Lead Co.
MICHIGAN		
Detroit	Detroit	Consolidated Smelting Corp.
Detroit	Detroit	Detroit Lead Corp.
Detroit	Detroit	Masters Metals
MINNESOTA		
St. Louis Park	Minneapolis-St. Paul	National Lead Co.
St. Paul	Minneapolis-St. Paul	Gopher Smelting & Refining Co.
MISSOURI		
St. Louis	St. Louis	National Lead Co.
NEBRASKA		
Fremont	--	National Lead Co.
Omaha	Omaha	Gould-National Batteries, Inc.

State City	SMSA	Company
NEW JERSEY		
Jersey City	Jersey City	Aetna Smelting & Refining Works
Newark	Newark	American Smelting & Refining Co.
Newark	Newark	Revere Smelting & Refining Co.
Perth Amboy	--	National Lead Co.
NEW YORK		
Depew	Buffalo	National Lead Co.
Tottenville	New York	Nassau Smelting & Refining Co.
NORTH CAROLINA		
Charlotte	Charlotte	Willard Smelting Co., Inc.
Winston-Salem	Greensboro-Winston Salem-High Point	Winston Lead Smelting Co.
OHIO		
Cincinnati	Cincinnati	National Lead Co.
Cleveland	Cleveland	Masters Metals
Cleveland	Cleveland	National Lead Co.
OREGON		
Portland	Portland	Morris P. Kirk & Son, Inc.
Portland	Portland	National Lead Co.
PENNSYLVANIA		
Hamburg	Reading	General Battery & Ceramic Corp.
Philadelphia	Philadelphia	Bers & Co., Inc.
Philadelphia	Philadelphia	Electric Storage Battery Co.
Pittsburgh	Pittsburgh	National Lead Co.
Reading	Reading	General Battery & Ceramic Corp.

State City	SMSA	Company
TENNESSEE		
Memphis	Memphis	Memphis Lead Co.
TEXAS		
Dallas	Dallas	Dixie Lead Co.
Dallas	Dallas	National Lead Co.
Dallas	Dallas	Southern Lead Co.
Fort Worth	Fort Worth	National Metal & Smelting Co.
Houston	Houston	American Smelting & Refining Co.
Houston	Houston	Lead Products Co.
Houston	Houston	National Lead Co.
UTAH		
Salt Lake City	Salt Lake City	Morris P. Kirk & Son, Inc.
VIRGINIA		
Richmond	Richmond	Hyman Viener & Sons
WASHINGTON		
Seattle	Seattle-Everett	The Bunker Hill Co., Pacific Div.
Seattle	Seattle-Everett	Morris P. Kirk & Son
WISCONSIN		
Milwaukee	Milwaukee	Allied Smelting Corp.

Table F-19. ZINC DISTILLERS (SECONDARY)
1967

State City	SMSA	Company
ALABAMA		
Fairfield	Birmingham	W. J. Bullock, Inc.
CALIFORNIA		
Torrance	Los Angeles-Long Beach	Pacific Smelting Co.
ILLINOIS		
Chicago	Chicago	Sipi Metals Corp.
Hillsboro	--	American Zinc Co. of Illinois
Sandoval	--	Sandoval Zinc Co.
NEW JERSEY		
Trenton	Trenton	American Smelting & Refining Co., Federated Metals Division-Trenton Plant
Trenton	Trenton	American Smelting & Refining Co. Federated Metals Division-Trenton Plant
OHIO		
Martins Ferry	Wheeling	Wheeling Steel Corp.
OKLAHOMA		
Sand Springs	Tulsa	American Smelting & Refining Co., Federated Metals Division-Sand Springs Plant
PENNSYLVANIA		
Bristol	Philadelphia	Superior Zinc Corp.
Philadelphia	Philadelphia	General Smelting Co.
TEXAS		
Houston	Houston	Gulf Reduction Corp.

F.12 Petroleum Refining

The modern petroleum refinery is a complex operation involving a multitude of processes and technologies. Although each refinery is unique in the many aspects of equipment type, size, arrangement, degree of processing sophistication, and type and amount of crude oil processed, the entire operation can be defined in terms of four major steps--separation, conversion, treating, and blending.

The crude oil is first separated into selected fractions (gasoline, kerosene, fuel oil, etc.). Then, since the volumes of each fraction may not conform to the relative demand, some of the less valuable fractions are converted to products of greater value (e.g., heavy naphtha to gasoline) by splitting, uniting, or rearranging the original molecules. Next, the products from both the separation and conversion steps are treated, usually by the removal or inhibition of gum-forming materials. Sulfur removal is very important either to enable processing without destroying the catalyst or to produce a low sulfur fuel essential to its ultimate use. Finally, the refined base stocks are usually blended with each other and with various additives to meet product specifications and to arrive at the optimum combination of products.

There were 269 refineries in the United States as of January 1, 1968(34) (see table F-20). Of those, 48 refineries, with about 27 percent of total capacity, are in Texas; 31, with 13 percent total capacity, are in California; and 16, with about 10 percent of total capacity, are in Louisiana. The remaining 50 percent of the national capacity are in 36 States; Oklahoma, Pennsylvania, Illinois, Kansas, Indiana, Ohio, and Michigan each have 10 or more refineries totaling approximately 30 percent of national capacity.

Refineries of 3,000 or more barrels per day capacity (one barrel is equivalent to 42 gallons) total 224 with 140 (approximately 63 percent) located in SMSA's. Texas has 32 of 39 refineries located in SMSA's, California has 28 of 30 refineries in SMSA's and Louisiana has 6 of 11 refineries in SMSA's. Geographical distribution is shown in figure F-17.

One geographical area totally devoid of petroleum refineries is the northeastern section of the country. However, the location of a refinery in Maine is under consideration.

Plant capacities range from about 1,000 barrels to over 400,000 barrels per day. Average national capacity is 41,500 barrels per day. Average capacity for plants of 3,000 or more barrels per day is 49,000 barrels per day.

Major pollutants from refineries are hydrocarbons, sulfur oxides, nitrogen oxides, carbon monoxide, and malodorous materials; lesser emissions include particulates, ammonia, aldehydes, and organic acids. Odors come principally from hydrogen sulfide and mercaptans. Since the quantities of emissions--based on crude capacity or fuel consumption of one refinery in comparison with known emissions from another refinery--are too inaccurate to use in individual plant emission appraisals, emissions must be evaluated according to the complexity and variability of processing, type of crude oil, and abatement facilities used in an individual plant.

Catalyst regeneration units emit particulate matter, sulfur oxides, hydrocarbons, and carbon monoxide. Sulfur oxides are emitted in large amounts from boilers and process heaters during the burning of process gas in refineries that do not have sulfur recovery plants; process gas is a by-product from such processes as catalytic cracking, reforming,

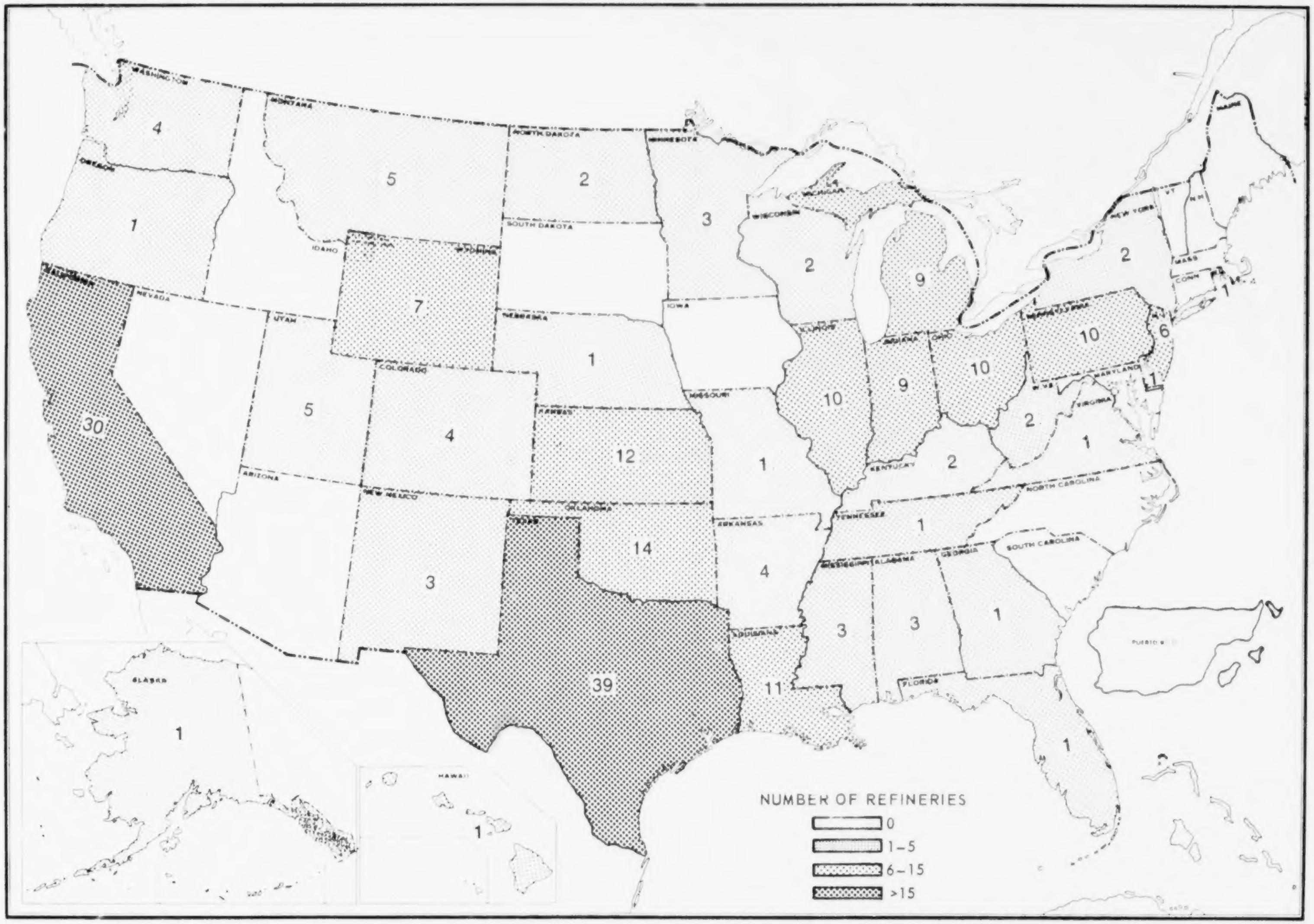
WASHINGTON
4
OREGON
1
CALIFORNIA
30
NEVADA
IDAHO
MONTANA
5
WYOMING
7
UTAH
5
COLORADO
4
ARIZONA
NEW MEXICO
3
NORTH DAKOTA
2
SOUTH DAKOTA
NEBRASKA
1
KANSAS
12
OKLAHOMA
14
TEXAS
39
MINNESOTA
3
IOWA
MISSOURI
1
ARKANSAS
4
LOUISIANA
11
WISCONSIN
2
MICHIGAN
9
ILLINOIS
10
INDIANA
9
OHIO
10
KENTUCKY
2
TENNESSEE
1
MISSISSIPPI
3
ALABAMA
3
GEORGIA
1
FLORIDA
1
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
1
2
PENNSYLVANIA
10
MARYLAND
6
NEW YORK
2
VT
NH
MAINE
MASS
CONN
1
ALASKA
1
HAWAII
1
PUERTO RICO
NUMBER OF REFINERIES
0
1–5
6–15
>15

Figure F-17. Petroleum refineries--capacity $\geq$ 3,000 barrels per day, 1968.

hydrocracking, hydrotreating, etc. Hydrocarbons are emitted from storage tanks, loading facilities, waste water separators, pumps and compressors, pipeline valves, flares, blowdown and pressure relief systems, plant shutdowns, and other miscellaneous sources.

Most refineries use facilities to reduce hydrocarbon and sulfur emissions to an economic level, and the diversity of operations among these refineries allows the use of most of the various types of air pollution control equipment--electrostatic precipitators, impact separators, absorbers, scrubbers, fabric filters, etc. In addition, much control is accomplished through plant design, equipment design, process modifications, good operational practices, prompt and effective maintenance, and good housekeeping practices.

Table F-20. PETROLEUM REFINERIES
3000 Barrels or More Per Calendar Day
January 1968

State City	SMSA	Company	Crude Capacity, bbl
ALABAMA			
Mobile	Mobile	Alabama Refining Co.	10,000
Mobile	Mobile	Chevron Asphalt Co.	6,000
Tuscaloosa	Tuscaloosa	Hunt Oil Co.	9,000
ALASKA			
Kenai	--	Standard Oil Co. of California, Western Operations, Inc.	20,000
ARKANSAS			
El Dorado	--	American Oil Co.	43,600
El Dorado	--	Lion Oil, Hydrocarbons & Polymers Div., Monsanto Co.	36,000
Norphlet	--	Macmillan Ring-Free Oil Co., Inc.	4,400
Smackover	--	Cross Oil & Refining Co. of Arkansas	3,350
CALIFORNIA			
Avon	San Francisco-Oakland	Phillips Petroleum Co.	120,000
Arroyo Grande	--	Union Oil Co. of California	33,000
Bakersfield	Bakersfield	Kern County Refinery, Inc.	12,000
Bakersfield	Bakersfield	Mohawk Petroleum Co.	21,000
Bakersfield	Bakersfield	Signal Oil & Gas Co.	22,000
Bakersfield	Bakersfield	Standard Oil Co. of California, Western Operations, Inc.	26,000
Bakersfield	Bakersfield	Sunland Refining Corp.	5,350
El Segundo	Los Angeles-Long Beach	Standard Oil Co. of California	150,000

State City	SMSA	Company	Crude Capacity, bbl
CALIFORNIA (cont.)			
Hanford	--	Beacon Oil Co.	11,375
Hercules	San Francisco-Oakland	Sequoia Refining Corp.	25,000*
Long Beach	Los Angeles-Long Beach	Edgington Oil Refineries, Inc.	16,000
Martinez	San Francisco-Oakland	Shell Oil Co.	86,000
Newhall	Los Angeles-Long Beach	Newhall Refining Company	6,500*
Oildale	Bakersfield	Golden Bear Div., Witco Chemical Co.	9,350
Oildale	Bakersfield	West Coast Oil Co.	3,500
Paramount	Los Angeles-Long Beach	Douglas Oil Co. of California	22,000
Richmond	San Francisco-Oakland	Standard Oil Co. of California	190,000
Rodeo	San Francisco-Oakland	Union Oil Co. of California	56,000
Santa Fe Springs	Los Angeles-Long Beach	Powerine Oil Co.	20,000
Santa Fe Springs	Los Angeles-Long Beach	Gulf Oil Corp.	46,900
Santa Maria	Santa Barbara	Douglas Oil Co. of California	6,600
Signal Hill	Los Angeles-Long Beach	Macmillan Ring-Free Oil Co., Inc.	10,000
Torrance	Los Angeles-Long Beach	Golden Eagle Refining Co., Inc.	9,500
Torrance	Los Angeles-Long Beach	Mobil Oil Corp.	110,000
Ventura	Oxnard-Ventura	Utility Refining Co.	8,100
Watson	Los Angeles-Long Beach	Atlantic Richfield Co., Richfield Div.	165,000
Wilmington	Los Angeles-Long Beach	Fletcher Oil & Refining Co.	14,000
Wilmington	Los Angeles-Long Beach	Shell Oil Co.	83,000
Wilmington	Los Angeles-Long Beach	Texaco, Inc.	60,000
Wilmington	Los Angeles-Long Beach	Union Oil Co.	101,000
COLORADO			
Denver	Denver	Continental Oil Co.	25,500
Denver	Denver	Tenneco Oil Co.	10,000

State City	SMSA	Company	Crude Capacity, bbl
COLORADO (cont.)			
Grand Junction	--	American Gilsonite Co.	5,400
Rangely	--	Lubco Oil & Refining Co.	5,000
DELAWARE			
Delaware City	Wilmington	Getty Oil Co.	140,000
FLORIDA			
St. Marks	--	Seminole Asphalt Refining Ltd.	3,100
GEORGIA			
Savannah	Savannah	American Oil Co.	8,000*
HAWAII			
Honolulu	Honolulu	Standard Oil Co. of California, Western Operations, Inc.	35,000
ILLINOIS			
Blue Island	Chicago	Clark Oil & Refining Co.	57,000
East St. Louis	St. Louis	Mobil Oil Corp.	47,000
Hartford	St. Louis	Clark Oil & Refining Co.	35,000
Lawrenceville	--	Texaco,Inc.	81,000
Lemont	Chicago	Union Oil Co. of California	52,000
Lockport	Chicago	Texaco,Inc.	72,000
Pana	--	Pana Refining Co.	6,500
Robinson	--	Marathon Oil Co.	68,400
Wood River	St. Louis	American Oil Co.	86,500
Wood River	St. Louis	Shell Oil Co.	194,000
INDIANA			
East Chicago	Gary-Hammond-East Chicago	Cities Service Oil Co.	56,000

State City	SMSA	Company	Crude Capacity, bbl
INDIANA (cont.)			
East Chicago	Gary-Hammond-East Chicago	Mobil Oil Corp.	43,000
East Chicago	Gary-Hammond-East Chicago	Sinclair Refining Co.	120,000
Fort Wayne	Fort Wayne	Gladieux Refinery, Inc.	3,000*
Indianapolis	Indianapolis	Rock Island Refining Corp.	22,600
Laketon	--	Laketon Asphalt Refining, Inc.	5,500
Mount Vernon	--	Indiana Farm Bureau Co͞op. Association, Inc.	12,800
Princeton	--	R. J. Oil & Refining Co., Inc.	4,900
Whiting	Gary-Hammond-East Chicago	American Oil Co.	241,000
KANSAS			
Arkansas City	--	Apco Oil Corp.	19,000
Augusta	Wichita	Mobil Oil Corp.	46,000
Chanute	--	Mid-America Refining Co., Inc.	3,000
Coffeyville	--	CRA, Inc.	28,500
El Dorado	Wichita	American Petrofina Co. of Texas	21,400
El Dorado	Wichita	Skelly Oil Co.	65,000
Kansas City	Kansas City	Phillips Petroleum Co.	85,000
McPherson	--	National Cooperative Refinery Association	38,000
Neodesha	--	American Oil Co.	30,800
Phillipsburg	--	CRA, Inc.	16,500
Shallow Water	--	Century Refining Co.	3,800
Wichita	Wichita	Derby Refining Co.	23,400
KENTUCKY			
Catlettsburg	Huntington-Ashland	Ashland Oil & Refining Co.	107,000
Louisville	Louisville	Louisville Refining Co. (affiliate of (Ashland Oil & Refining Co.)	18,000

State City	SMSA	Company	Crude Capacity, bbl
LOUISIANA			
Baton Rouge	Baton Rouge	Humble Oil & Refining Co.	419,000
Chalmette	New Orleans	Tenneco Oil Co.	76,000
Convent	--	Texaco, Inc.	110,000
Cotton Valley	--	Cotton Valley Solvents Co.	7,600
Jennings	--	Evangeline Refining Co.	3,600
Lake Charles	Lake Charles	Cities Service Oil Co.	185,000
Meraux	New Orleans	Murphy Oil Corp.	29,000
Norco	--	Shell Oil Co.	170,000
Shreveport	Shreveport	Atlas Processing Co.	18,500
Venice	--	Gulf Oil Corp.	20,300
Westlake	Lake Charles	Continental Oil Co.	66,500
MARYLAND			
Baltimore	Baltimore	American Oil Co.	12,000
Baltimore	Baltimore	Chevron Asphalt Co.	7,400
MICHIGAN			
Alma	--	Leonard Refineries, Inc.	27,750
Bay City	Bay City	Bay Refining Co., Div. of Dow Chemical Co.	15,000
Carson City	--	Crystal Refining Co.	6,200
Detroit	Detroit	Marathon Oil Co.	48,000
Kalamazoo	Kalamazoo	Lakeside Refining Co.	4,000*
Muskegon	Muskegon-Muskegon Heights	Naph-Sol Refining Co.	10,000*
Rapid River	--	Delta Terminal Co.	4,000*
Trenton	Detroit	Mobil Oil Corp.	40,700
West Branch	--	Osceola Refining Co., Inc.	5,000

State City	SMSA	Company	Crude Capacity, bbl
LOUISIANA			
Baton Rouge	Baton Rouge	Humble Oil & Refining Co.	419,000
Chalmette	New Orleans	Tenneco Oil Co.	76,000
Convent	--	Texaco, Inc.	110,000
Cotton Valley	--	Cotton Valley Solvents Co.	7,600
Jennings	--	Evangeline Refining Co.	3,600
Lake Charles	Lake Charles	Cities Service Oil Co.	185,000
Meraux	New Orleans	Murphy Oil Corp.	29,000
Norco	--	Shell Oil Co.	170,000
Shreveport	Shreveport	Atlas Processing Co.	18,500
Venice	--	Gulf Oil Corp.	20,300
Westlake	Lake Charles	Continental Oil Co.	66,500
MARYLAND			
Baltimore	Baltimore	American Oil Co.	12,000
Baltimore	Baltimore	Chevron Asphalt Co.	7,400
MICHIGAN			
Alma	--	Leonard Refineries, Inc.	27,750
Bay City	Bay City	Bay Refining Co., Div. of Dow Chemical Co.	15,000
Carson City	--	Crystal Refining Co.	6,200
Detroit	Detroit	Marathon Oil Co.	48,000
Kalamazoo	Kalamazoo	Lakeside Refining Co.	4,000*
Muskegon	Muskegon-Muskegon Heights	Naph-Sol Refining Co.	10,000*
Rapid River	--	Delta Terminal Co.	4,000*
Trenton	Detroit	Mobil Oil Corp.	40,700
West Branch	--	Osceola Refining Co., Inc.	5,000

State City	SMSA	Company	Crude Capacity, bbl
MINNESOTA			
Pine Bend	Minneapolis-St. Paul	Great Northern Oil Co.	62,300
St. Paul Park	Minneapolis-St. Paul	Northwestern Refining Co.	40,000
Wrenshall	--	Internation Refineries, Inc. (subsidiary of Continental Oil Co.)	16,800
MISSISSIPPI			
Pascagoula	--	Standard Oil Co. (Kentucky) subsidiary of Standard of California	135,000
Purvis	--	Gulf Oil Corp.	23,800
Sandersville	--	Southland Oil Co.	6,000
MISSOURI			
Sugar Creek	Kansas City	American Oil Co.	83,000
MONTANA			
Billings	Billings	Continental Oil Co.	42,000
Billings	Billings	Humble Oil & Refining Co.	39,000
Cut Bank	--	Union Oil Co. of California	3,800
Great Falls	Great Falls	Phillips Petroleum Co.	4,500
Laurel	Billings	Farmers Union Central Exchange	26,000
NEBRASKA			
Scottsbluff	--	CRA, Inc.	4,000
NEW JERSEY			
Bayonne	Jersey City	Humble Oil & Refining Co.	30,000
Linden	Newark	Humble Oil & Refining Co.	157,000
Paulsboro	Philadelphia	Mobil Oil Co.	79,000
Perth Amboy	--	Chevron Oil Co., Eastern Div.	80,000

State City	SMSA	Company	Crude Capacity, bbl
NEW JERSEY (cont.)			
Port Reading	--	Hess Oil & Chemical Corp.	70,000
Westville	Philadelphia	Texaco, Inc.	85,000
NEW MEXICO			
Artesia	--	Continental Oil Co.	16,500
Ciniza	--	Shell Oil Co.	14,000
Monument	--	Famariss Oil & Refining Co.	4,420
NEW YORK			
Buffalo	Buffalo	Mobil Oil Corp.	38,000
North Tonawanda	Buffalo	Frontier Oil & Refining Co., Div. of Ashland Oil & Refining Co.	35,000
NORTH DAKOTA			
Mandan	--	American Oil Co.	50,000
Williston	--	Westland Oil Co.	5,000
OHIO			
Canton	Canton	Ashland Oil & Refining Co.	38,000
Cincinnati	Cincinnati	Chevron Asphalt Co.	11,500
Cincinnati	Cincinnati	Gulf Oil Corp.	40,000
Findlay	--	Ashland Oil & Refining Co.	17,000
Lima	Lima	Standard Oil Co. (Ohio) Cleveland	56,000
Newark	--	Union Oil Co. of California	20,000
Toledo	Toledo	Gulf Oil Corp.	46,800
Toledo	Toledo	Standard Oil Co. (Ohio)	116,500
Toledo	Toledo	Sun Oil Co.	112,000
Toledo	Toledo	Union Oil Co. of California	28,000

State City	SMSA	Company	Crude Capacity, bbl
OKLAHOMA			
Ardmore	--	Bell Oil and Gas Co.	27,000*
Arnett	--	Tonkawa Refining Co.	7,500
Cushing	--	Kerr-McGee Corp.	14,000
Cushing	--	Midland Cooperatives, Inc.	16,165
Cyril	--	Apco Oil Corp.	10,000
Duncan	--	Sunray DX Oil Co.	45,000
Enid	--	Champlin Petroleum Co.	34,000
Okmulgee	--	Okmulgee Refining Co.	19,000
Ponca City	--	Continental Oil Co.	77,500
Ponca City	--	Sequoia Refining Corp.	35,000
Stroud	--	Allied Materials Corp.	4,500
Tulsa	Tulsa	Sunray DX Oil Co.	84,000
West Tulsa	Tulsa	Texaco, Inc.	47,000
Wynnewood	--	Kerr-McGee Corp.	24,000
OREGON			
Portland	Portland	Chevron Asphalt Co.	11,000
PENNSYLVANIA			
Bradford	--	Kendall Refining Co., Div. of Witco Chemical Co.	5,600
Emleton	--	Quaker State Oil Refining Corp.	3,150
Farmers Valley	--	Quaker State Oil Refining Corp.	4,250
Freedom	Pittsburgh	Valvoline Oil Co., Div. of Ashland Oil & Refining Co.	5,550
Marcus Hook	Philadelphia	Sinclair Refining Co.	104,000
Marcus Hook	Philadelphia	Sun Oil Co.	153,000

State City	SMSA	Company	Crude Capacity, bbl
PENNSYLVANIA (cont.)			
Oil City	--	Pennzoil Co.	10,000
Philadelphia	Philadelphia	Atlantic Richfield Co., Atlantic Div.	155,000
Philadelphia	Philadelphia	Gulf Oil Corp.	158,300
Warren	--	United Refining Co.	16,500
RHODE ISLAND			
East Providence	Providence-Pawtucket-Warwick	Mobil Oil Corp.	7,500
TENNESSEE			
Memphis	Memphis	Delta Refining Co.	25,000
TEXAS			
Abilene	Abilene	Adobe Refining Co.	5,500
Amarillo	Amarillo	Texaco, Inc.	19,000
Baytown	Houston	Humble Oil & Refining Co.	340,000
Big Spring	--	Cosden Oil & Chemical Co.	30,000
Beaumont	Beaumont-Port Arthur-Orange	Mobil Oil Co.	280,000
Borger	--	Phillips Petroleum Co.	85,000
Colorado City	--	Cosden Oil & Chemical Co.	13,000
Corpus Christi	Corpus Christi	Coastal States Petrochemical Co.	80,000*
Corpus Christi	Corpus Christi	Hess Oil & Chemical Corp.	47,000
Corpus Christi	Corpus Christi	Howell Refining Corp.	10,000
Corpus Christi	Corpus Christi	Pontiac Refining Corp.	53,000
Corpus Christi	Corpus Christi	Southwestern Oil & Refining Co.	46,000
Corpus Christi	Corpus Christi	Suntide Refining Co.	54,000
Deer Park	Houston	Shell Oil Co.	155,000
El Paso	El Paso	Chevron Oil Co., Western Div.	65,000

State City	SMSA	Company	Crude Capacity, bbl
TEXAS (cont.)			
El Paso	El Paso	Texaco,Inc.	16,000
Fort Worth	Fort Worth	Fort Worth Refining Co. (formerly operated by Premier Oil Refining)	12,000
Houston	Houston	Signal Oil & Gas Co.	72,000
Houston	Houston	Sinclair Refining Co.	200,000
La Blanca	McAllen-Pharr-Edinburg	Adobe Refining Co.	5,000
Longview	--	Longview Refining Co. (formerly operated by Premier Oil Refining)	4,500
Lueders	Abilene	Petroleum Refining Co.	3,000
Mount Pleasant	--	American Petrofina Co. of Texas	22,000
Nederland	Beaumont-Port Arthur-Orange	Union Oil Co., of California	95,000
Odessa	Odessa	Shell Oil Co.	24,500
Pasadena	Houston	Bayou Refining Co., Inc.	7,200
Pasadena	Houston	Crown Central Petroleum Corp.	40,000
Port Arthur	Beaumont-Port Arthur-Orange	Gulf Oil Corp.	293,000
Port Arthur	Beaumont-Port Arthur-Orange	Atlantic Richfield Co., Atlantic Div.	84,000
Port Arthur	Beaumont-Port Arthur-Orange	Texaco, Inc.	310,000
Port Neches	Beaumont-Port Arthur-Orange	Texaco, Inc.	45,000
San Antonio	San Antonio	Howell Refining Corp.	3,500
Sunray	--	Shamrock Oil & Gas Corp.	34,500
Sweeny	Houston	Phillips Petroleum Co.	95,000
Texas City	Galveston-Texas City	American Oil Co.	241,000
Texas City	Galveston-Texas City	Marathon Oil Co.	42,750
Texas City	Galveston-Texas City	Texas City Refining Inc.	52,500
Tyler	Tyler	La Gloria Oil & Gas Co.	24,000
Winnie	--	Union Texas Petroleum, Div. of Allied Chemical Corp.	8,150

State City	SMSA	Company	Crude Capacity, bbl
UTAH			
N. Salt Lake	Salt Lake City	Frontier Refining Co.	8,000
Salt Lake City	Salt Lake City	American Oil Co.	37,600
Salt Lake City	Salt Lake City	Chevron Oil Co., Western Div.	43,000
Woods Cross	Salt Lake City	Caribou Four Corners Oil Co.	3,300
Woods Cross	Salt Lake City	Phillips Petroleum Co.	20,000
VIRGINIA			
Yorktown	Newport News-Hampton	American Oil Co.	43,600
WASHINGTON			
Anacortes	--	Shell Oil Co.	84,000
Anacortes	--	Texaco, Inc.	60,000
Ferndale	--	Mobil Oil Corp.	45,000
Tacoma	Tacoma	U.S. Oil & Refining Co.	12,500
WEST VIRGINIA			
Falling Rock	Charleston	Elk Refining Co.	4,200
St. Marys	--	Quaker State Oil Refining Corp.	4,170
WISCONSIN			
Sheboygan	--	Empire Petroleum Co.	4,000
Superior	Duluth-Superior	Murphy Oil Corp.	21,000
WYOMING			
Casper	--	American Oil Co.	34,000
Casper	--	Texaco, Inc.	20,000
Cheyenne	--	Frontier Refining Co.	17,500
Cody	--	Husky Oil Co.	10,400

State City	SMSA	Company	Crude Capacity, bbl
WYOMING (cont.)			
Newcastle	--	Sioux Oil Co.	7,500
Sinclair	--	Sinclair Refining Co.	26,000
Thermopolis	--	Empire State Oil Co.	5,000*

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*Barrels per stream day

F.13 Phosphate Fertilizers

Phosphate rock is the basic raw material for all phosphate fertilizers. Florida supplies over two-thirds of the total U.S. mine output. Following preliminary conditioning and grinding, the rock is either processed into phosphoric acid or used directly in the production of phosphate fertilizers.

Normal superphosphate, which is declining rapidly in relative importance, is being supplanted by higher analysis fertilizers. Major production facilities total 157(35,36) (see table F-21), with the majority of plants concentrated toward the southeastern portion of the country. Figure F-18 depicts plant distribution in the United States; 67 percent of the plants are within SMSA's. Most plants operate from 200 to 300 days per year; production in 1967 was 1,184,000 tons of phosphorus pentoxide (P_2O_5), including all grades containing less than 40 percent of available P_2O_5.(37)

Triple superphosphate differs in manufacture from normal superphosphate; principally, phosphoric acid is used to react with phosphate rock, whereas sulfuric acid is used to produce normal superphosphate. There are 22 triple superphosphate plants,(38) (see table F-22) mostly located near phosphate rock mining areas; 13 are in Florida, 3 in Idaho, and one each in California, Maryland, Mississippi, Missouri, North Carolina, and Utah. Geographic distribution of plants is shown in figure F-19; only 5 manufacturing sites are within SMSA's. Plant capacity varies from 35,000 tons to 850,000 tons per year. Production in 1967 was 1,481,000 tons of P_2O_5.(37)

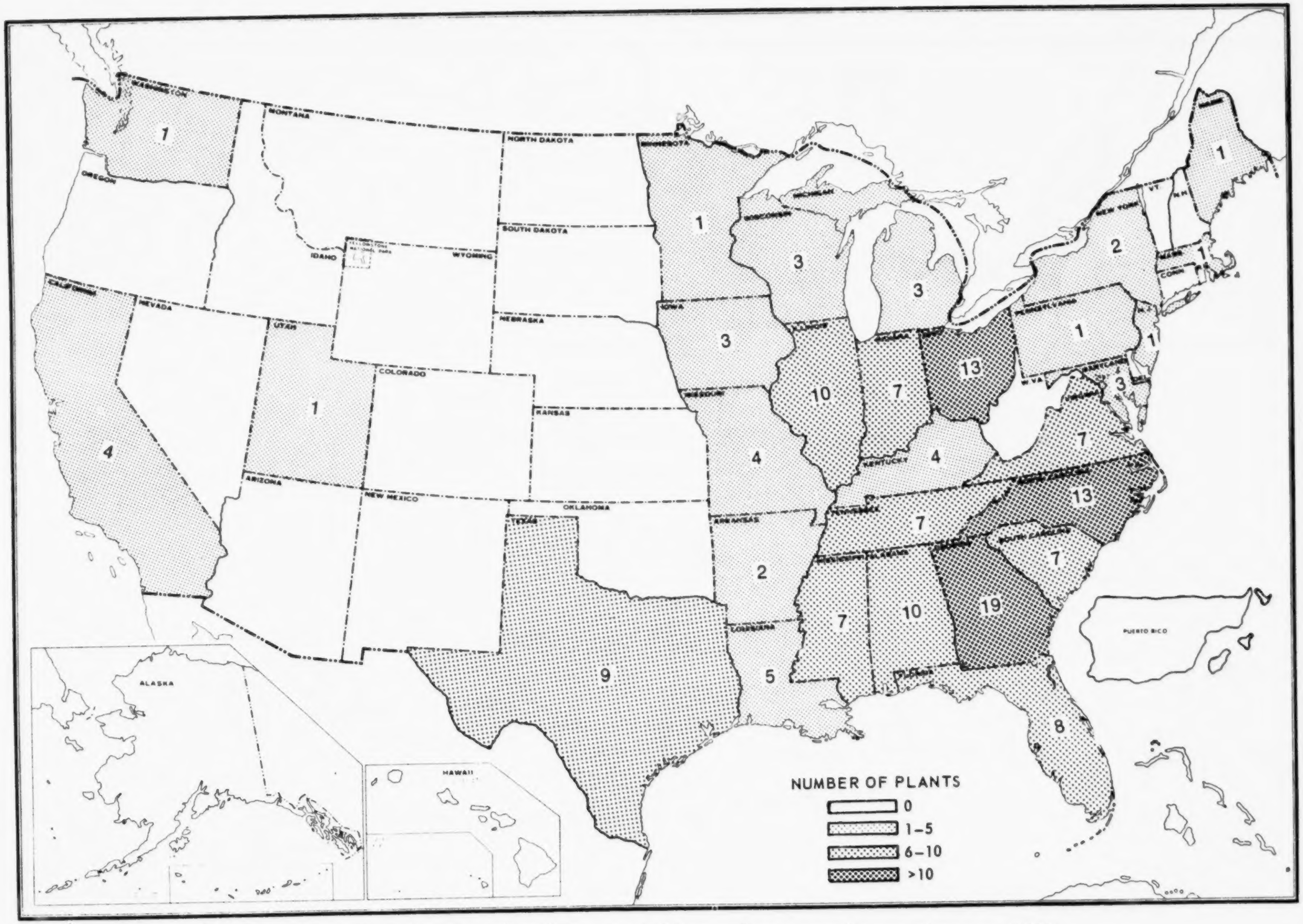

WASHINGTON
1
OREGON
CALIFORNIA
4
NEVADA
IDAHO
MONTANA
WYOMING
YELLOWSTONE NATIONAL PARK
UTAH
1
ARIZONA
COLORADO
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
9
MINNESOTA
1
IOWA
3
MISSOURI
4
ARKANSAS
2
LOUISIANA
5
WISCONSIN
3
MICHIGAN
3
ILLINOIS
10
INDIANA
7
OHIO
13
KENTUCKY
4
TENNESSEE
7
MISSISSIPPI
7
ALABAMA
10
GEORGIA
19
FLORIDA
8
SOUTH CAROLINA
7
NORTH CAROLINA
13
VIRGINIA
7
VA
3
PENNSYLVANIA
1
1
NEW YORK
2
VT
N.H.
MAINE
1
MASS
1
CONN
4
PUERTO RICO
ALASKA
HAWAII
NUMBER OF PLANTS
0
1–5
6–10
>10

Figure F-18. Normal superphosphate fertilizer plants--major producers, 1967.

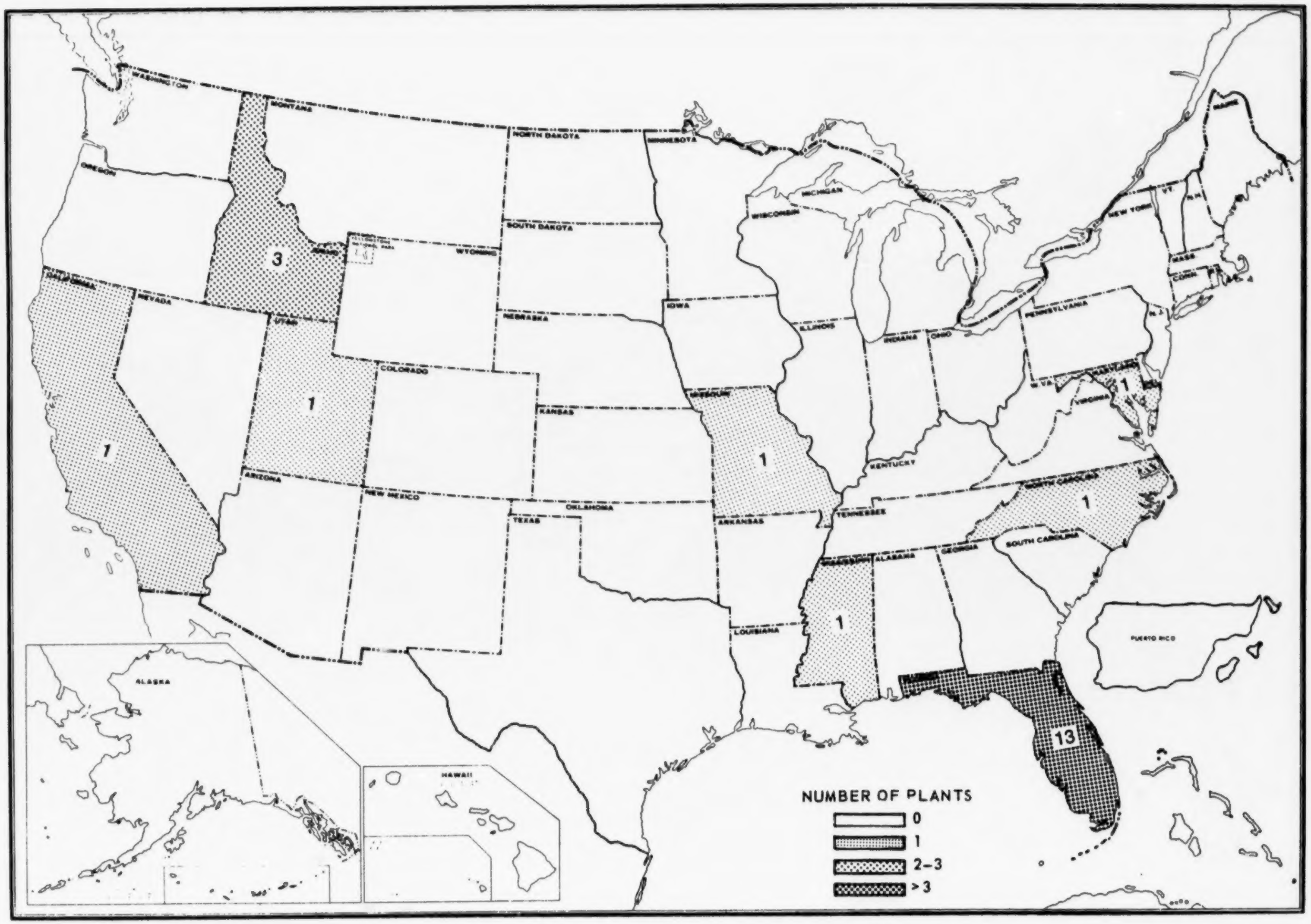

WASHINGTON
OREGON
CALIFORNIA
NEVADA
IDAHO
MONTANA
WYOMING
UTAH
COLORADO
ARIZONA
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
MINNESOTA
IOWA
MISSOURI
ARKANSAS
LOUISIANA
WISCONSIN
MICHIGAN
ILLINOIS
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
W. VA.
PENNSYLVANIA
NEW YORK
VT.
N.H.
MAINE
MASS.
CONN.
N.J.
PUERTO RICO
ALASKA
HAWAII
3
1
1
1
1
1
1
13
NUMBER OF PLANTS
0
1
2–3
>3

Figure F-19. Triple superphosphate plants, 1968.

Ammonium phosphate plants use phosphoric acid, ammonia, and sulfuric acid. Whereas normal and triple superphosphate typical grades respectively contain 18 and 45 percent of P_2O_5 nutrient (54 percent produced by acidulation with superphosphoric acid), a typical ammonium phosphate grade contains 64 percent nutrient. There are 54 ammonium phosphate fertilizer plants today, with more being built(38) (see table F-23). Plant capacity ranges from 10,000 tons to 600,000 tons per year. Production in 1967 was 1,747,000 tons P_2O_5.(37) Florida (with 12 plants), Illinois (with 7 plants), and California (with 6 plants) account for almost one-half of the plants. Of the 54 plant sites, 21 are within SMSA's. The map displayed in figure F-20 shows the geographical distribution of the plants.

Granulation is a method of processing to improve the storage and handling properties of certain fertilizers by increasing the particle size. There are some 350 granulation plants in 39 states(36) (see table F-24). The majority of plants are in the midwest and southeastern states; 51 percent of the plants are located within SMSA's. The geographical distribution of plants is shown in figure F-21.

There were an estimated 3,153 bulk-blend fertilizer plants in 1966.(39) A geographical breakdown shows 21 plants in New England, 137 in Middle Atlantic, 255 in South Atlantic, 107 in South Central, 900 in East North Central, 1,110 in West North Central, 254 in West South Central, 191 in Mountain, and 174 in Pacific States. Hawaii has 4 plants.

The primary pollutant generated in phosphate rock preparation from bulk-blending and mixing plants is dust. Operations equipped with inertial separators, wet scrubbers, or fabric filters attain 99 percent or more efficiency. Wet scrubbers are used effectively in recovering ammonia from granulation plants, but a high pressure drop scrubber is

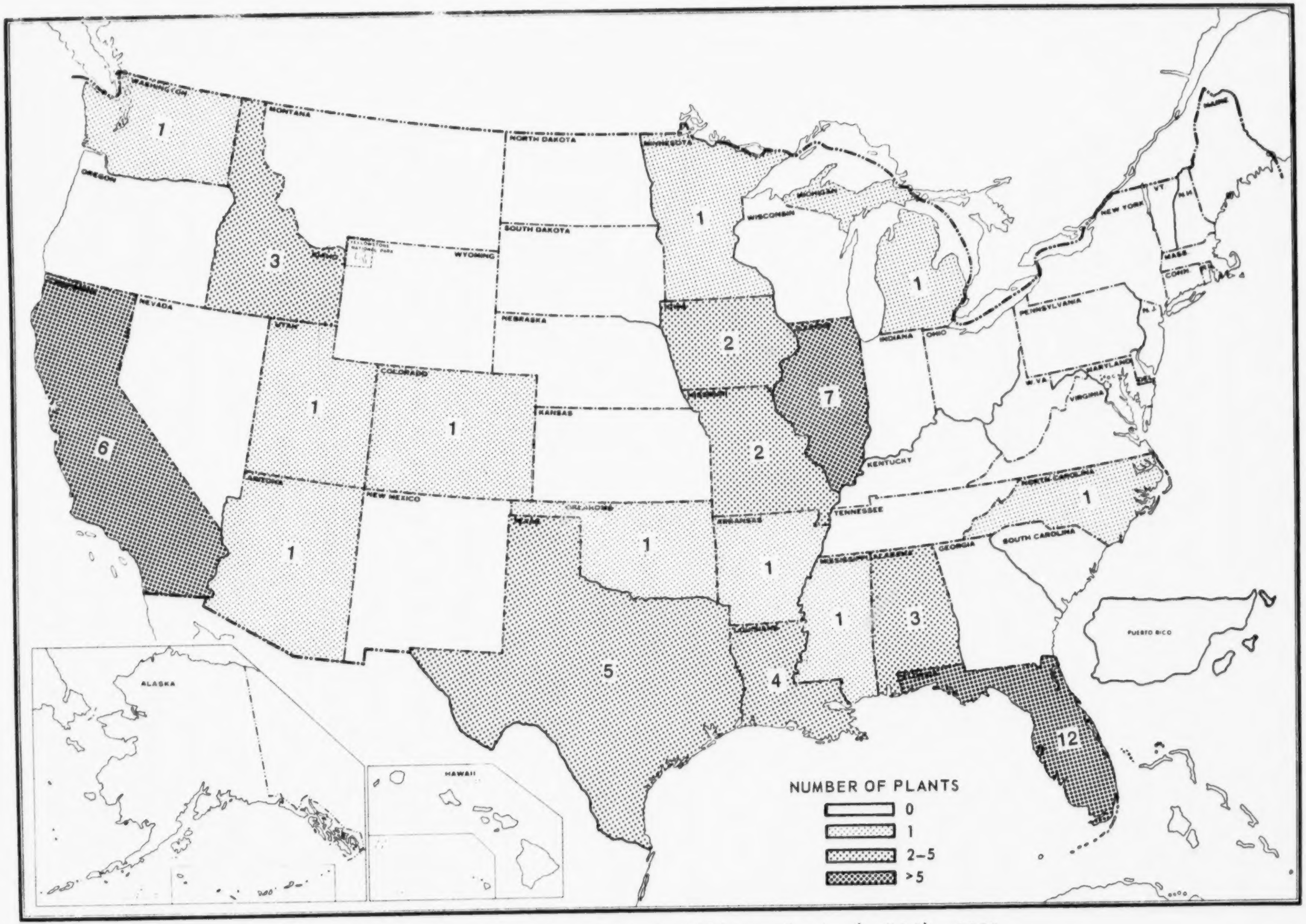

WASHINGTON
1
OREGON
MONTANA
IDAHO
3
NORTH DAKOTA
SOUTH DAKOTA
WYOMING
YELLOWSTONE NATIONAL PARK
NEVADA
6
UTAH
1
COLORADO
1
NEBRASKA
KANSAS
ARIZONA
1
NEW MEXICO
OKLAHOMA
1
TEXAS
5
MINNESOTA
1
WISCONSIN
MICHIGAN
1
IOWA
2
MISSOURI
2
ILLINOIS
7
INDIANA
OHIO
KENTUCKY
TENNESSEE
ARKANSAS
1
LOUISIANA
4
MISSISSIPPI
1
ALABAMA
3
GEORGIA
FLORIDA
12
SOUTH CAROLINA
NORTH CAROLINA
1
VIRGINIA
W. VA.
MARYLAND
PENNSYLVANIA
N.J.
NEW YORK
VT.
N.H.
MAINE
MASS.
CONN.
PUERTO RICO
ALASKA
HAWAII
NUMBER OF PLANTS
0
1
2–5
>5

Figure F-20. Ammonium phosphate fertilizer plants (solid), 1968.

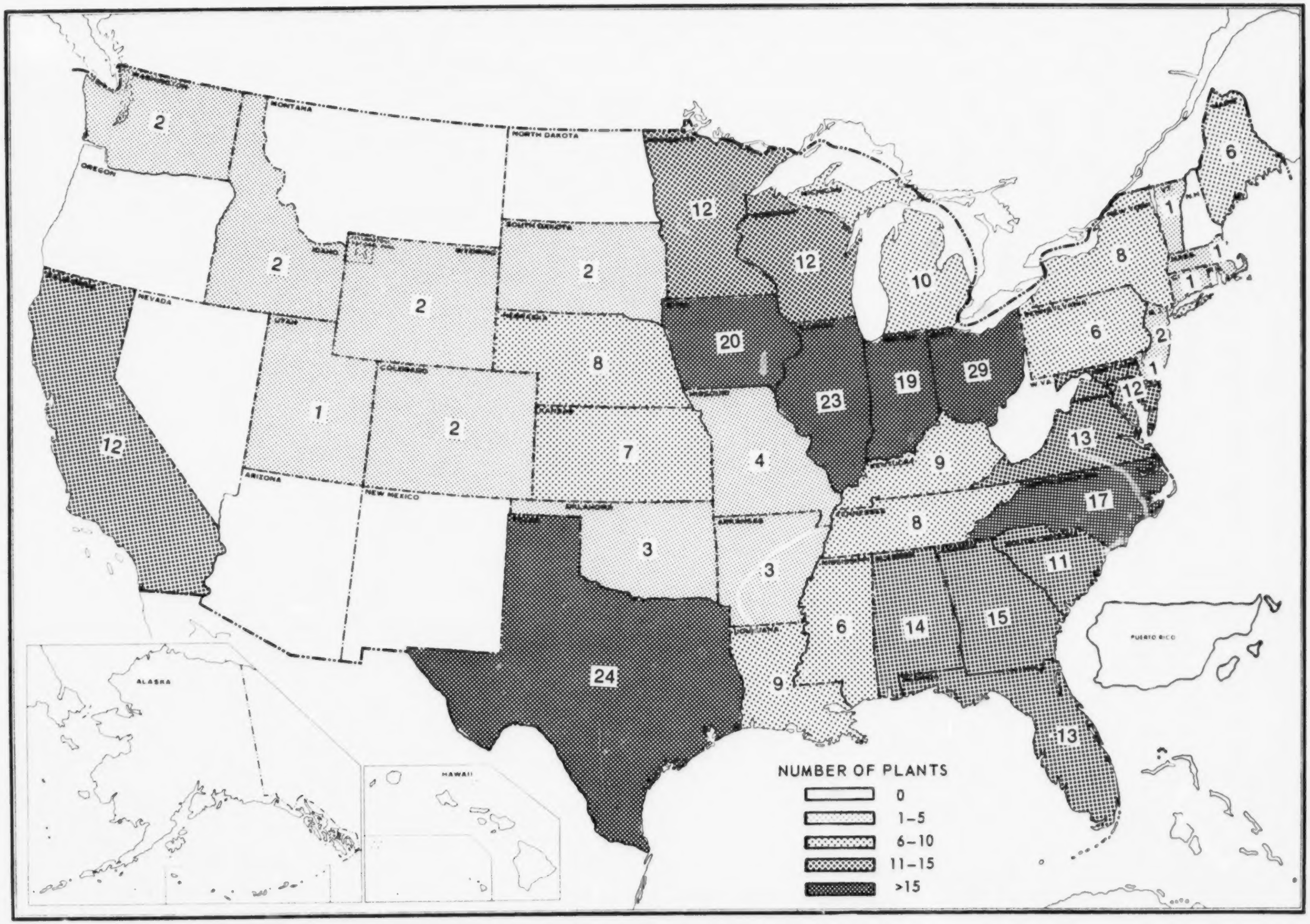

WASHINGTON
2
OREGON
MONTANA
NORTH DAKOTA
2
2
2
12
12
10
6
1
1
1
8
6
2
1
12
NEVADA
12
UTAH
1
COLORADO
2
8
20
23
19
29
7
4
9
13
17
ARIZONA
NEW MEXICO
3
3
8
11
24
9
6
14
15
13
PUERTO RICO
ALASKA
HAWAII
NUMBER OF PLANTS
0
1–5
6–10
11–15
>15

Figure F-21. Granulated fertilizer plants, 1967.

required for recovery of the fine ammonium salts.

Principal emissions from normal and triple superphosphate and ammonium phosphate operations are silicon tetrafluoride, hydrogen fluoride, ammonia, and particulates. Usual methods of control are scrubbers, inertial separators, and fabric filters. Some building ventilation air contains appreciable amounts of fluorides and should be treated prior to exhausting. Large settling and holding ponds of recycled plant water may also emit fluorides to the atmosphere.

Table F-21. NORMAL SUPERPHOSPHATE PLANTS
Major Producers
1968

State City	SMSA	Company	Capacity, tons per year
ALABAMA			
Aliceville	--	Valley Fertilizer Co.	15,000
Bessemer	Birmingham	F.S. Royster Guano Co.	50,000
Birmingham	Birmingham	Mobil Chemical Co.	-
Cullman	--	International Minerals & Chemical Corp.	-
Decatur	--	Alabama Farmers Cooperative, Inc.	50,000
Dothan	--	The Home Guano Co.	40,000
Dothan	--	Mobil Chemical Co.	-
Florence	--	International Minerals & Chemical Corp.	-
Montgomery	Montgomery	Capital Fertilizer Co.	-
Selma	--	Centrala Farmers Cooperative, Inc.	20,000
ARKANSAS			
North Little Rock	Little Rock-N. Little Rock	Olin Mathieson Chemical Co.	-
Texarkana	Texarkana	International Minerals & Chemical Corp.	-
CALIFORNIA			
Bena	Bakersfield	AFC, Inc.	20 T/hr
Lathrop	Stockton	Best Fertilizers Co.	-
Los Angeles	Los Angeles-Long Beach	Stauffer Chemical Co.	-

State City	SMSA	Company	Capacity, tons per year
CALIFORNIA (cont.)			
Nichols	San Francisco-Oakland	Western States Chemical Co.	60,000
FLORIDA			
Bartow	--	W.R. Grace & Co.	-
Jacksonville	Jacksonville	Armour Agric. Chemical	-
Jacksonville	Jacksonville	Wilson & Toomer Fertilizer Co.	125,000
Nichols	--	Mobil Chemical Co.	-
Pensacola	Pensacola	Agrico Chemical Co.	-
Pierce	--	Agrico Chemical Co.	-
Tampa	Tampa-St. Petersburg	Tennessee Corp.	-
Tampa	Tampa-St. Petersburg	W.R. Grace & Co.	-
GEORGIA			
Albany	Albany	Armour Agric. Chemical	-
Albany	Albany	Swift & Co.	-
Americus	--	International Minerals & Chemical Corp.	-
Athens	--	F.S. Royster Guano Co.	75,000
Atlanta	Atlanta	Swift & Co.	-
Augusta	Augusta	Etheridge Fertilizer Co.	25,000
Columbus	Columbus	Armour Agric. Chemical	-
Cordele	--	Cotton Producers Assn.	100,000
East Point	Atlanta	International Minerals & Chem.	-
East Point	Atlanta	Tennessee Corp.	25,000
Macon	Macon	Cotton States Fertilizer Co.	40,000

State City	SMSA	Company	Capacity, tons per year
GEORGIA (cont.)			
Macon	Macon	F.S. Royster Guano Co.	50,000
Moultrie	--	Smith Fertilizer & Chem. Co.	100,000
Pelham	--	Pelham Phosphate Co.	60,000
Savannah	Savannah	Kaiser Agricultural Chemicals	-
Savannah	Savannah	Southern States Phosphate & Fertilizer Co.	100,000
Savannah	Savannah	Mobil Chemical Co.	-
Tifton	--	International Minerals & Chem. Corp.	-
Valdosta	--	Georgia Fertilizer Co.	75,000
ILLINOIS			
Ashkum	--	Occidental Agricultural Chemicals Corp.	-
Calumet City	Chicago	Swift & Co.	-
Chicago Heights	Chicago	Armour Agriculture Co.	-
Chicago Heights	Chicago	International Minerals & Chemical Corp.	-
E. St. Louis	St. Louis	Armour Agricultural Co.	-
E. St. Louis	St. Louis	FS Services, Inc.	60,000
E. St. Louis	St. Louis	Mobil Chemical Co.	-
Granite City	St. Louis	American Phosphate Co.	-
Morris	--	Gilchrist Plant Food Co.	-
National Stock Yards	St. Louis	Swift & Co.	-

State City	SMSA	Company	Capacity, tons per year
INDIANA			
Fort Wayne	Fort Wayne	Mobil Chemical Co.	-
Indianapolis	Indianapolis	F.S. Royster Guano Co.	90,000
Indianapolis	Indianapolis	Indiana Farm Bureau Cooperative Assoc., Inc.	90,000
Indianapolis	Indianapolis	International Minerals & Chemical Corp.	-
Indianapolis	Indianapolis	Smith-Douglass Div., Borden Chemical Co.	-
Jeffersonville	Louisville	Indiana Farm Bureau Cooperative Assoc., Inc.	40,000
Schererville	Chicago	Indiana Farm Bureau Cooperative Assoc., Inc.	60,000
IOWA			
Dubuque	Dubuque	Mobil Chemical Co.	-
Eagle Grove	--	Farmland Industries, Inc.	25,000
Mason City	--	International Minerals & Chemical Corp.	-
KENTUCKY			
Danville	--	Cardinal Chemical Co.	20 T/hr
London	--	Agrico Chemical Co.	-
Russellville	--	Commonwealth Fertilizer Co., Inc.	25,000
Winchester	Louisville	Cooperative Fertilizer Serv. of Richmond, Va.	20,000
LOUISIANA			
Baton Rouge	Baton Rouge	Louisiana Agricultural Supply Co., Inc.	25,000
Bunkie	--	Bunkie Phosphate Co., Inc.	15,000
Lake Charles	Lake Charles	Kelly-Weber & Co., Inc.	30,000
New Orleans	New Orleans	USS Agri-Chemicals, Inc., U.S. Steel Corp.	4 T/batch
Shreveport	Shreveport	Mobil Chemical Co.	-

State City	SMSA	Company	Capacity, tons per year
MAINE			
Searsport	--	W.R. Grace & Co.--Northern Chemical Industries, Inc.	-
MARYLAND			
Baltimore	Baltimore	Agrico Chemical Co.	-
Baltimore	Baltimore	Kerr-McGee Chemical Co.	-
Baltimore	Baltimore	F.S. Royster Guano Co.	100,000
MASSACHUSETTS			
Lowell	Boston	Lowell Rendering Co.	20,000
MICHIGAN			
Saginaw	Saginaw	Agrico Chemical Co.	-
Saginaw	Saginaw	Farm Bureau Services, Inc.	50,000
Saginaw	Saginaw	Smith-Douglass Div., Borden Chemical Co.	-
MINNESOTA			
Winona	--	Cenex	50,000
MISSISSIPPI			
Canton	--	Coastal Chemical Corp.	40,000
Hattiesburg	--	Coastal Chemical Corp.	40,000
Jackson	Jackson	F.S. Royster Guano Co.	50,000
Jackson	Jackson	Mobil Chemical Co.	-

State City	SMSA	Company	Capacity, tons per year
MISSISSIPPI (cont.)			
Marks	--	Riverside Fertilizer Co.	-
Meridian	--	Coastal Chemical Corp.	10 T/hr
New Albany	--	Coastal Chemical Corp.	40,000
MISSOURI			
Joplin	--	W.R. Grace & Co.	-
Maryland Heights	St. Louis	M.F.A. Plant Food Div., Missouri Farmers Assoc.	-
St. Joseph	St. Joseph	Farmland Industries, Inc.	-
Springfield	Springfield	M.F.A. Plant Food Div., Missouri Farmers Assoc.	-
NEW JERSEY			
Carteret	--	Agrico Chemical Co.	-
NEW YORK			
Buffalo	Buffalo	Agrico Chemical Co.	-
Buffalo	Buffalo	International Minerals & Chemical Corp.	-
NORTH CAROLINA			
Acme	--	Acme Fertilizer	50,000
Charlotte	Charlotte	F.S. Royster Guano Co.	50,000
Greensboro	Greensboro-Winstcn-Salem-High Point	Agrico Chemical Co.	-
Greensboro	Greensboro-Winston-Salem-High Point	Armour Agricultural Chemical	-
Greensboro	Greensboro-Winston-Salem-High Point	Swift & Co.	-

State City	SMSA	Company	Capacity, tons per year
NORTH CAROLINA (cont.)			
Laurinburg	--	Dixie Guano Co.	15 T/hr
Navassa	Wilmington	Armour Agricultural Chemical	-
Riegelwood	--	Kaiser Agricultural Chemicals	-
Selma	--	Mobil Chemical Co.	-
Waynesville	--	Western Carolina Phosphate Co.	30,000
Wilmington	Wilmington	Mobil Chemical Co.	-
Wilmington	Wilmington	Swift & Co.	-
Winston-Salem	Greensboro-Winston-Salem-High Point	International Minerals & Chemical Corp.	-
OHIO			
Cairo	--	Agrico Chemical Co.	-
Cincinnati	Cincinnati	Agrico Chemical Co.	-
Cincinnati	Cincinnati	Armour Agricultural Chemical	-
Cincinnati	Cincinnati	International Minerals & Chemical Corp.	-
Cincinnati	Cincinnati	Mobil Chemical Co.	-
Cincinnati	Cincinnati	Tennessee Corp.	100,000
Cleveland	Cleveland	Agrico Chemical Co.	-
Cleveland	Cleveland	Swift & Co.	-
Columbus	Columbus	Federal Chemical Co.	-
Columbus	Columbus	Smith-Douglass Div., Borden Chemical Co.	-
Dayton	Dayton	Farm Bureau Cooperative Fertilizer Assoc., Inc.	20 T/hr
Toledo	Toledo	F.S. Royster Guano Co.	100,000
Washington Court House	--	Agrico Chemical Co.	-

State City	SMSA	Company	Capacity, tons per year
PENNSYLVANIA			
Philadelphia	Philadelphia	Kerr-McGee Chemical Co.	-
SOUTH CAROLINA			
Anderson	--	Anderson Fertilizer Co., Inc.	50,000
Charleston	Charleston	Agrico Chemical Co.	-
Charleston	Charleston	F.S. Royster Guano Co.	40,000
Charleston	Charleston	Mobil Chemical Co.	-
Charleston	Charleston	Planters Fertilizer & Phosphate Co.	100,000
Hartsville	--	International Minerals & Chemical Corp.	-
Spartanburg	--	International Minerals & Chemical Corp.	-
TENNESSEE			
Knoxville	Knoxville	Agrico Chemical Co.	-
La Vergne	--	Tennessee Farmers Cooperative	30,000
Memphis	Memphis	Mobil Chemical Co.	-
Mt. Pleasant	--	Mobil Chemical Co.	-
Nashville	Nashville	Armour Agricultural Chemical	-
Nashville	Nashville	Federal Chemical Co.	-
Tenco	Knoxville	Tennessee Farmers Cooperative	30,000
TEXAS			
Comanche	--	Central Texas Fertilizer Co.	15,000
El Paso	El Paso	W.R. Grace & Co.	-
Fort Worth	Fort Worth	International Minerals & Chemical Corp.	-
Galena Park	Houston	American Plant Food Corp.	-

State City	SMSA	Company	Capacity, tons per year
TEXAS (cont.)			
Greenville	--	International Minerals & Chemical Corp.	-
Littlefield	--	Caprock Fertilizer Co.	30,000
Littlefield	--	Nipak	30,000
Pasadena	Houston	Olin Mathieson Chemical Co.	-
Plainview	--	Best Fertilizers Co.	-
UTAH			
Midvale	Salt Lake City	Mineral Fertilizer Co.	25,000
VIRGINIA			
Chesapeake	Norfolk-Portsmouth	F.S. Royster Guano Co.	100,000
Norfolk	Norfolk-Portsmouth	Farmers Guano Co.	-
Norfolk	Norfolk-Portsmouth	Smith-Douglass Div., Borden Chemical Co.	60,000
Norfolk	Norfolk-Portsmouth	W.R. Grace & Co.	-
Richmond	Richmond	Mobil Chemical Co.	-
Richmond	Richmond	Richmond Guano Co.	60,000
South Norfolk	Norfolk-Portsmouth	Swift & Co.	20 T/hr
WASHINGTON			
Tacoma	Tacoma	Stauffer Chemical Co.	-
WISCONSIN			
Green Bay	Green Bay	Northwest Cooperative Mills	30,000
Madison	Madison	F.S. Royster Guano Co.	80,000
Prairie DuChien	--	F.S. Services, Inc., Wisconsin Div.	120,000

Table F-22. TRIPLE SUPERPHOSPHATE PLANTS
June 1968

State City	SMSA	Company	Capacity Tons Per Year
CALIFORNIA			
Bena	Bakersfield	AFC, Inc.	170,000
FLORIDA			
Agricola	--	Swift and Co.	170,000
Bartow	--	Davison Chemical (W. R. Grace)	450,000
Bartow	--	International Minerals & Chemical	450,000
Brewster	--	American Cyanamid	380,000
Bartow & Fort Meade	--	USS Chemicals, U.S. Steel Corp.	600,000
Green Bay	--	Farmland Industries	80,000
Mulberry	--	F. S. Royster Guano	110,000
Nichols	--	Mobil Chemical	400,000
Piney Point	--	Bordon Chemical	180,000
Plant City	Tampa-St. Petersburg	Central Phosphates	--
South Pierce	--	Agrico Chemical (Conoco)	500,000
Tampa	Tampa-St. Petersburg	U.S. Phosphoric Products (Cities Service)	850,000
White Springs	--	Occidental Agricultural	200,000
IDAHO			
Georgetown	--	Central Farmers Fertilizers	200,000
Idaho Falls	--	J. R. Simplot Co.	--
Pocatello	--	J. R. Simplot Co.	360,000
MARYLAND			
Baltimore	Baltimore	Kerr-McGee Chemical	--

State City	SMSA	Company	Capacity Tons Per Year
MISSISSIPPI			
Pascagoula	--	Coastal Chemical	300,000
MISSOURI			
Joplin	--	Davison Chemical (W. R. Grace)	35,000
NORTH CAROLINA			
Aurora	--	Texas Gulf Sulphur	300,000
UTAH			
Garfield	Salt Lake City	Western Phosphates (Stauffer)	75,000

Table F-23. AMMONIUM PHOSPHATE FERTILIZER PLANTS (SOLID)
1968

State City	SMSA	Company	Capacity, tons per year
ALABAMA			
Cherokee	--	USS Agri-Chemicals, Inc., U.S. Steel Corp.	180,000
Midland City	--	United Chemical Corp.	240,000
Muscle Shoals	--	Tennessee Valley Authority	27,000
ARIZONA			
Phoenix	Phoenix	Arizona Agrochemical	-
ARKANSAS			
Helena	--	Arkla Chemical	290,000
CALIFORNIA			
Bena	Bakersfield	Agricultural Fert. Chem.	90,000
Dominguez	Los Angeles-Long Beach	Western States Chemical	50,000
Fontana	San Bernardino-Riverside-Ontario	Kaiser Steel	28,000
Helm	Fresno	Valley Nitrogen Producers	100,000
Lathrop	Stockton	Best Fertilizers (Occidental)	-
Pittsburg	San Francisco-Oakland	Shell Chemical	10,000
FLORIDA			
Bartow	--	W.R. Grace & Co.	200,000
Bartow	--	USS Agri-Chemicals, Inc., U.S. Steel Corp.	-
Bonnie	--	International Minerals & Chemicals	350,000
Brewster	--	American Cyanamid	200,000
East Tampa	Tampa-St. Petersburg	U.S. Phosphoric Products	225,000

State City	SMSA	Company	Capacity, tons per year
FLORIDA (cont.)			
Green Bay	--	Farmland Industries	200,000
Mulberry	--	F.S. Royster Guano Co.	90,000
Nichols	--	Mobil Chemical Co.	100,000
Piney Point	--	Borden Chemical Co.	185,000
Plant City	Tampa-St. Petersburg	Central Phosphates	250,000
South Pierce	--	Agrico Chemical Co. (Conoco)	250,000
White Springs	--	Occidental Agricultural	250,000
COLORADO			
Pueblo	Pueblo	Colorado Fuel and Iron	15,000
IDAHO			
Kellogg	--	Bunker Hill	-
Kellogg	--	Victor Chemical	70,000
Pocatello	--	J.R. Simplot	200,000
ILLINOIS			
Chicago Heights	Chicago	Victor Chemical	-
Danville	--	U.S. Industrial Chemicals	-
Depue	--	New Jersey Zinc	270,000
Henry	--	W.R. Grace & Co.	100,000
Joliet	Chicago	Olin Mathieson Chemical	200,000
Marseilles	--	National Phosphate	150,000
Streater	--	Smith-Douglas Div., Borden Chemical Co.	-

State City	SMSA	Company	Capacity, tons per year
IOWA			
Dubuque	Dubuque	Olin Mathieson Chemical	-
Fort Madison	--	Chevron Chemical	-
LOUISIANA			
Donaldsonville	--	Gulf Oil	-
Hahnville	--	National Phosphate	350,000
Harvey	New Orleans	Swift & Co.	150,000
Luling	--	Monsanto	240,000
MICHIGAN			
Dearborn	Detroit	Ford Motor Co.	14,000
MINNESOTA			
Pine Bend	Minneapolis-St. Paul	Northwest Co-op. Mills	100,000
MISSISSIPPI			
Pascagoula	--	Coastal Chemical	180,000
MISSOURI			
Joplin	--	Farmers Chemical	70,000
Joplin	--	W.R. Grace & Co.	-
NORTH CAROLINA			
Aurora	--	Texas Gulf Sulphur	250,000
OKLAHOMA			
Tulsa	Tulsa	Nipak, Inc.	75,000
TEXAS			
Houston	Houston	Phosphate Chemicals	150,000
Kerens	--	Nipak, Inc.	100,000

State City	SMSA	Company	Capacity, tons per year
TEXAS (cont.)			
Pasadena	Houston	Olin Mathieson Chemical	600,000
Plainview	--	Best Fertilizers (Occidental)	-
Texas City	Galveston-Texas City	Smith-Douglass Div., Borden Chemical Co.	-
UTAH			
Garfield	Salt Lake City	Western Phosphates	-
WASHINGTON			
Kennewick	--	Chevron Chemical	-

Table F-24. FERTILIZER GRANULATION PLANTS
December 1967

State City	SMSA	Company	Capacity, Tons per Year
ALABAMA			
Bessemer	Birmingham	F. A. Royster Guano Co.	50,000
Birmingham	Birmingham	V-C Chemical Co. (Mobil)	-
Columbia	--	Gulf Oil Co.	-
Decatur	--	Ala. Farmers Co-op, Inc.	50,000
Decatur	--	Coastal Chemical Corp.	40,000
Dothan	--	V-C Chemical Co. (Mobil)	-
Florence	--	International Minerals & Chem.	-
Forkland	--	Centrala Farmers Co-op	50,000
Hanceville	--	The Cotton Producers Assn.	50,000
Montgomery	Montgomery	Capital Fertilizer Co.	25,000
Montgomery	Montgomery	V-C Chemical Co. (Mobil)	-
Montgomery	Montgomery	Tennessee Corp.	40,000
Montgomery	Montgomery	F. S. Royster Guano Co.	-
Sheffield	--	Tennessee Farmers Co-op	-
ARKANSAS			
Little Rock	Little Rock-North Little Rock	Southern Cotton Oil Div.	-
Texarkana	Texarkana	International Minerals & Chem. Corp.	-
Walnut Ridge	--	Ark-Mo Plant Food Co.	100,000
CALIFORNIA			
Antioch	San Francisco-Oakland	Kerley Chem. Corp.	100,000
Blythe	San Bernardino-Riverside-Ontario	The Arical Co., Inc.	-
Compton	Los Angeles-Long Beach	Dominguez Fertilizers, Inc.	50,000

State City	SMSA	Company	Capacity Tons per Year
CALIFORNIA (cont.)			
Edison	Bakersfield	AFC, Inc.	100,000
Fresno	Fresno	Niagara Chem. Div. (FMC)	-
Lathrop	Stockton	Occidental Chemical Co.	90,000
Los Angeles	Los Angeles-Long Beach	Stauffer Chem. Co.	-
Los Angeles	Los Angeles-Long Beach	Swift & Co.	-
Los Angeles	Los Angeles-Long Beach	Wilbur-Ellis Co.	25,000
Nichols	San Francisco-Oakland	Western States Chem. Corp.	60,000
Richmond	San Francisco-Oakland	Stauffer Chem. Co.	50,000
Santa Rosa	--	Fersolin Corp.	8,000
COLORADO			
Denver	Denver	Bennett Chem. Co.	10,000
Longmont	Denver	Farm Chemical Co.	150,000
CONNECTICUT			
Waterbury	Waterbury	Kerr-McGee Chemical Co.	-
DELAWARE			
Wilmington	Wilmington	Agway, Inc., Fertilizer Div.	25,000
FLORIDA			
Bartow	--	Farmland Industries, Inc.	-
Cottondale	--	Cartledge Fertilizer Co.	50,000
Fort Pierce	--	Briggs Fertilizer Co.	-
Fort Pierce	--	W. R. Grace & Co.	-
Jacksonville	Jacksonville	USS Agri-Chemicals, Inc., Div. U.S. Steel Corp.	-
Jacksonville	Jacksonville	Wilson & Toomer Fertilizer Co.	125,000
Mulberry	--	International Minerals & Chemical	-

State City	SMSA	Company	Capacity, Tons per Year
FLORIDA (cont.)			
Pensacola	Pensacola	Agrico Chemical Co.	-
Pensacola	Pensacola	Merchants Fertilizer Co.	30,000
Pensacola	Pensacola	Kerr-McGee Chemical Corp.	-
Piney Point	--	The Borden Chemical Co.	-
Tampa	Tampa-St. Petersburg	Earl Harrell's Fertilizer Co.	-
Winter Haven	--	Swift & Co.	-
GEORGIA			
Albany	Albany	USS Agri-Chemicals, Inc., Div. U.S. Steel Corp.	-
Albany	Albany	Swift & Co.	-
Albany	Albany	V-C Chemical Co. (Mobil)	-
Americus	--	International Minerals & Chem. Corp.	-
Athens	--	F. S. Royster Guano Co.	-
Augusta	Augusta	International Minerals & Chem. Corp.	-
Cordele	--	The Cotton Producers Assn.	100,000
Doerun	--	Toney Brothers	-
Macon	Macon	F. S. Royster Guano Co.	-
Moultrie	--	C. O. Smith Fertilizer & Chemical Co.	100,000
Pelham	--	Pelham Phosphate Co.	60,000
Rome	--	V-C Chemical Co. (Mobil)	
Savannah	Savannah	Southern Fertilizer & Chemical Co.	150,000
Savannah	Savannah	V-C Chemical Co. (Mobil)	-
Tifton	--	Kerr-McGee Chemical Corp.	30,000
IDAHO			
Conda	--	El Paso Prod. Co.	125,000

State City	SMSA	Company	Capacity, Tons per Year
IDAHO (cont.)			
Pocatello	--	J. R. Simplot Co.	300,000
ILLINOIS			
Allertown	--	Allerton Supply Co.	15,000
Atlanta	--	Diamond Alkali Co.	-
Calumet City	Chicago	Swift & Co.	-
Chicago	Chicago	American Fertilizer Co.	-
Chicago	Chicago	Gillette Inhibitor Co., Inc.	6,000
Chicago Heights	Chicago	USS Agri-Chemicals, Inc., Div. U.S. Steel Corp.	-
Chicago Heights	Chicago	International Minerals & Chem. Corp.	-
Danville	--	Amer. Agric. Chem. Co. (Conoco)	-
Danville	--	U.S.I. Farm Chemicals	-
Decatur	Decatur	Perkinson Co.	20,000
Depue	--	New Jersey Zinc Co.	-
East St. Louis	St. Louis	USS Agri-Chemicals, Inc., Div. U.S. Steel Corp.	-
East St. Louis	St. Louis	Agrico Chem. Co. (Conoco)	-
East St. Louis	St. Louis	Darling & Co.	-
East St. Louis	St. Louis	V-C Chemical Co. (Mobil)	-
Effingham	--	Effingham Equity, Inc.	60,000
Fulton	--	Amer. Agric. Chem. Co.	-
Henry	--	W. R. Grace & Co.	-
Meredosia	--	A. B. Chrisman Fertilizer Co., Inc.	12,000
Morris	--	Gilchrist Plant Food Co.	-
National Stock Yards	St. Louis	Swift & Co.	-
Ridgway	--	Wabash Valley Service Co.	-
Swan Creek	--	Sands Elevator	-

State City	SMSA	Company	Capacity, Tons per Year
INDIANA			
Bryant	--	Occidental Chemicals Co.	25 tons/hr
Columbia City	--	Ind. Farm Bureau Co-op	40,000
Fairmount	--	Occidental Chemicals Co.	30 tons/hr
Fort Wayne	Fort Wayne	V-C Chemical Co. (Mobil)	-
Fulton	--	Occidental Agricultural Chemicals	20 tons/hr
Indianapolis	Indianapolis	Borden Chemical Co. - Smith-Douglass	-
Indianapolis	Indianapolis	International Minerals & Chem. Corp.	-
Indianapolis	Indianapolis	F. S. Royster Guano Co.	-
Jasonville	--	V-C Chemical Co. (Mobil)	-
Jeffersonville	Louisville	USS Agri-Chemicals, Inc., Div. U.S. Steel Corp.	-
Jeffersonville	Louisville	Ind. Farm Bureau Co-op Assn., Inc.	40,000
New Albany	Louisville	W. R. Grace & Co.	-
New Albany	Louisville	Tennessee Corp.	-
Peru	--	Federal Fertilizer Sales Corp.	35,000
Remington	--	V-C Chemical Co. (Mobil)	-
Rushville	--	Gulf Oil Corp. Chemicals	-
Rushville	--	Kerr-McGee Chemical Corp.	-
Seymour	--	Amer. Agric. Chem. Co. (Conoco)	-
Vincennes	--	Federal Fertilizer Sales Corp.	-
IOWA			
Alleman	Des Moines	Farmland Industries, Inc.	-
Auburn	--	Brincks Farm Supply	100 tons/hr
Des Moines	Des Moines	FS Services, Inc.	90,000
Des Moines	Des Moines	National Fertilizer Co.	15,000
Des Moines	Des Moines	Ross Daniels, Inc.	-

State City	SMSA	Company	Capacity, Tons per Year
IOWA (cont.)			
Dike	--	Allied Chemical Corp.	-
Dubuque	Dubuque	V-C Chemical Co. (Mobil)	-
Eagle Grove	--	Farmland Industries, Inc.	25,000
Estherville	--	V-C Chemical Co. (Mobil)	-
Ft. Madison	--	Chevron Chemical Co.	-
Humboldt	--	Amer. Agric. Chem. Co. (Conoco)	-
Mason City	--	International Minerals & Chem. Corp.	-
Mason City	--	Swift & Co.	-
Ottumwa	--	Super-Crop Plant Foods, Inc.	-
Ottumwa	--	H. D. Sales, Inc.	-
Perry	--	W. R. Grace & Co.	-
Pleasantville	--	Farm & Town Industries	-
Spirit Lake	--	Farmers Elevator Co.	-
Spencer	--	American Cyanamid Co.	-
Zearing	--	Zearing Fertilizer Co.	-
KANSAS			
Chanute	--	Mobil Chemical Co.	-
Downs	--	Huiting & Cary Fertilizer Service	-
Kansas City	Kansas City	Gulf Oil Corp.	-
Manhattan	--	Farmland Industries, Inc.	20 tons/hr
Marysville	--	Burger Fertilizer Co.	15,000
Olathe	Kansas City	Amer. Agric. Chem. Co. (Conoco)	-
Wankeeney	--	Turman Chemical Co.	-
KENTUCKY			
Cecilia	--	Gulf Oil Corp.	-

State City	SMSA	Company	Capacity, Tons per Year
KENTUCKY (cont.)			
Henderson	Evansville	Gulf Oil Corp.	-
Lexington	Lexington	Burley Belt Fertilizer Co.	35,000
London	--	Burley Belt Chemical Co.	20 tons/hr
Louisville	Louisville	North American Fertilizer Co.	45,000
Louisville	Louisville	F. S. Royster Guano Co.	-
Maysville	--	Ohio Valley Fertilizer, Inc.	20,000
Russelville	--	Southern States Co-op, Inc.	-
Shelbyville	--	Gro-Green Chem. Co., Inc.	-
LOUISIANA			
Arcadia	--	Ruston Oil Mill & Fertilizer Co.	10 tons/hr
Baton Rouge	Baton Rouge	Louisiana Ag. Supply Co., Inc.	25,000
Bunkie	--	Guaranty Seed Co., Inc.	10,000
Harvey	New Orleans	Swift & Co.	-
Jonesville	--	Brown Brothers	-
Lake Charles	Lake Charles	Kelly Weber & Co., Inc.	30,000
New Orleans	New Orleans	USS Agri-Chemicals, Inc., Div. U.S. Steel Corp.	-
Ruston	--	Ruston Oil Mill & Fertilizer Co.	-
Shreveport	Shreveport	V-C Chemical Co. (Mobil)	-
MAINE			
Caribou	--	Aroostook Federation of Farmers	25,000
Detroit	--	Agway, Inc.	25,000
Fort Kent	--	Aroostook Federation of Farmers	20,000
Greene	--	Fedco Farm Service	-
Presque Isle	--	Brockville Chemical Co.	16,000

State City	SMSA	Company	Capacity, Tons per Year
MAINE (cont.)			
Sandy Point	--	The Summers Fertilizer Co., Inc. (Corenco Corp.)	50,000
MARYLAND			
Baltimore	Baltimore	Amer. Agric. Chem. Co.	-
Baltimore	Baltimore	Mobil Chemical Co.	-
Baltimore	Baltimore	USS Agri-Chemicals, Inc., Div. U.S. Steel Corp.	-
Baltimore	Baltimore	Lebanon Chemical Corp.	-
Baltimore	Baltimore	F. S. Royster Guano Co.	-
Baltimore	Baltimore	Swift & Co.	-
Baltimore	Baltimore	Southern States Co-op	80,000
Cambridge	--	Kerr-McGee Chemical Corp.	-
Hagerstown	--	Central Chem. Corp.	-
Landover	Washington, D. C.	F. W. Bolgiano & Co.	10,000
Salisbury	--	W. B. Tilghman Co., Inc.	20,000
Whiteford	--	Miller Chem. & Fertilizer Corp.	15,000
MASSACHUSETTS			
Cambridge	Boston	Agway, Inc.	50,000
MICHIGAN			
Kalamazoo	Kalamazoo	Farm Bureau Services, Inc.	40,000
Lansing	Lansing	W. R. Grace & Co.	-
Marshall	--	Spieldenner Fertilizer Co.	-
Niles	--	Michiana Chem. Co.	30,000
Owosso	--	USS Agri-Chemicals, Inc., Div. U.S. Steel Corp.	-
Riga	--	Anderson Fertilizers	30 tons/hr
Riga	--	The Borden Chemical Co.	-

State City	SMSA	Company	Capacity, Tons per Year
MICHIGAN (cont.)			
Saginaw	Saginaw	Amer. Ag. Chem. Co.	-
Saginaw	Saginaw	Farm Bureau Services, Inc.	50,000
Saginaw	Saginaw	The Borden Chemical Co. (Smith-Douglass Div.)	-
MINNESOTA			
East Grand Forks	--	Northland Chem. Co., Inc.	10,000
Fergus Falls	--	Occidental Chemicals Corp.	60 tons/hr
Little Falls	--	Creamery Blending Inc.	-
Madison	--	Fieldcrest Fertilizer Co.	15,000
Minneapolis	Minneapolis-St. Paul	Howe, Inc.	30,000
Minneapolis	Minneapolis-St. Paul	Land O' Lakes Creameries, Inc.	50,000
Rochester	--	Rochester Fertilizer Co.	15 tons/hr
St. Paul	Minneapolis-St. Paul	Minnesota Farm Bureau Service Co.	60,000
South St. Paul	Minneapolis-St. Paul	Cenex, Inc.	-
Walnut Grove	--	American Cyanamid Co.	-
Winona	--	USS Agri-Chemicals, Inc., Div. U.S. Steel Corp.	-
Winona	--	Cenex, Inc.	-
MISSISSIPPI			
Jackson	Jackson	Delta Cotton Oil & Fertilizer Co.	25,000
Jackson	Jackson	F. S. Royster Guano Co.	-
Jackson	Jackson	V-C Chemical Co. (Mobil)	-
Meridan	--	Coastal Chemical Corp. Plant #1	-
Meridan	--	Coastal Chemical Corp. Plant #2	10 tons/hr
Tupelo	--	International Minerals & Chemical	-

State City	SMSA	Company	Capacity, Tons per Year
MISSOURI			
Edina	--	Northeast Mo. Co-op Swervices	-
Sikeston	--	Gulf Oil Corp.	-
South St. Joseph	St. Joseph	Farmland Industries, Inc.	25,000
Westboro	--	Herrick Feed & Produce	10 tons/hr
NEBRASKA			
Broken Bow	--	Co-op Marketing Assn.	-
Cozad	--	Cozad Elevator Inc.	20 tons/hr
Fairbury	--	National Fertilizer Co.	25,000
Grand Island	--	Gulf Oil Corp.	25,000
Harvard	--	Farmers Union Co-op Elevator	-
Holbrook	--	Holbrook Non-Stock Co-op Co.	-
Omaha	Omaha	Federal Chemical Co.	-
South Omaha	Omaha	Federal Chemical Co.	-
NEW JERSEY			
Carteret	--	Amer. Ag. Chem. Co. (Conoco)	-
Windsor	Trenton	USS Agri-Chemicals, Inc., Div. U.S. Steel Corp.	-
NEW YORK			
Albany	Albany-Schenectady-Troy	Agway, Inc.	50,000
Big Flats	--	Agway, Inc.	50,000
Buffalo	Buffalo	Amer. Ag. Chem. Co. (Conoco)	-
Buffalo	Buffalo	Inter. Minerals & Chem. Corp.	-
Lyons	Rochester	Agway, Inc.	50,000
Lyons	Rochester	F. S. Royster Guano Co.	-
Newark	Rochester	Kerr-McGee Chemical Corp.	-

State City	SMSA	Company	Capacity, Tons per Year
NEW YORK (cont.)			
Riverhead	New York	Long Island Produce Co.	30,000
NORTH CAROLINA			
Acme	--	Acme Fertilizer Co.	40,000
Charlotte	Charlotte	F. S. Royster Guano Co.	-
Greensboro	Greensboro-Winston-Salem-High Point	Amer. Ag. Chem. Co.	-
Greensboro	Greensboro-Winston-Salem-High Point	USS Agri-Chemical, Inc., Div. U.S. Steel Corp.	-
Greensboro	Greensboro-Winston-Salem-High Point	Swift & Co.	-
Kinston	--	Borden Chemical Co., Smith-Douglass Div.	60,000
Lumberton	--	FCX, Inc.	-
Laurinburg	--	Dixie Guano Co.	-
Selma	--	V-C Chemical Co. (Mobil)	-
Statesville	--	W. R. Grace & Co.	-
Wilmington	Wilmington	USS Agri-Chemical, Inc., Div. U.S. Steel Corp.	-
Wilmington	Wilmington	Swift & Co.	-
Wilmington	Wilmington	Borden Chemical Co., Smith-Douglass Div.	-
Wilmington	Wilmington	V-C Chemical Co. (Mobil)	-
Wilmington	Wilmington	W. R. Grace & Co.	-
Wilmington	Wilmington	F. W. Royster Guano Co.	-
Winston-Salem	Greensboro-Winston-Salem-High Point	International Minerals	-
OHIO			
Alliance	Canton	W. R. Grace & Co.	-
Andover	--	Central Chem. Corp. of Ohio	6,000
Bradner	Toledo	F. S. Royster Guano	-
Cairo	--	Amer. Ag. Chem. Co.	-
Chillicothe	--	Scioto Farm Chem., Inc.	10,000

State City	SMSA	Company	Capacity, Tons per Year
OHIO (cont.)			
Cincinnati	Cincinnati	USS Agri-Chemical, Inc., Div. U.S. Steel Corp.	-
Cincinnati	Cincinnati	Internat. Minerals & Chem. Corp.	-
Cincinnati	Cincinnati	V-C Chemical Co. (Mobil)	-
Cleveland	Cleveland	Amer. Ag. Chem. Co.	-
Cleveland	Cleveland	The Stadler Fertilizer Co.	50,000
Columbus	Columbus	Federal Chemical Co.	-
Columbus	Columbus	W. R. Grace & Co.	-
Columbus	Columbus	Smith-Douglass Co., Inc. (Borden Chemical)	-
Dayton	Dayton	Landmark Farm Bureau Co-op	20 tons/hr
Findlay	--	W. R. Grace & Co.	-
Fostoria	--	Kerr-McGee Chemical Corp.	-
Greenville	--	Swift & Co.	-
Lima	Lima	Mobil Chemical	-
Marion	--	Marion Plant Life Fertilizer Co.	50,000
Marysville	--	Scott Chem. Plant, Inc.	15,000
Mount Gilead	--	Landmark Farm Bureau Co-op	-
Napoleon	--	Midwest Plant Food, Inc.	20,000
New Bremen	--	Occidental Chemical Co.	15,000
Orrville	--	V-C Chemical Co. (Mobil)	-
Piqua	Dayton	F. S. Royster Co.	-
St. Paris	--	Occidental Chemicals Co.	20,000
Smithville	--	Tyler Grain & Fertilizer Co.	20 tons/hr
Toledo	Toledo	F. S. Royster Co.	-
Washington Court House	--	Amer. Ag. Chem. Co.	-

State City	SMSA	Company	Capacity, Tons per Year
OKLAHOMA			
Muskogee	--	Farmland Industries, Inc.	30,000
Oklahoma City	Oklahoma City	American Cyanamid Co.	-
Tulsa	Tulsa	Nipak, Inc.	75,000
PENNSYLVANIA			
Allentown	Allentown-Bethlehem-Easton	Robert A. Reichard, Inc.	20,000
Hanover	York	Miller Chem. & Fertilizer Corp.	15,000
Kittanning	--	Agway, Inc.	40,000
Lebanon	--	Lebanon Chem. Corp.	-
Philadelphia	Philadelphia	Kerr-McGee Chemical Co.	-
York	York	Agway, Inc.	50,000
SOUTH CAROLINA			
Blackville	--	Brown Fertilizer Co., Inc.	8,000
Charleston	Charleston	Amer. Ag. Chemical Co. (Conoco)	-
Charleston	Charleston	W. R. Grace & Co.	-
Charleston	Charleston	Planters Fertilizer & Phosphate Co.	100,000
Charleston	Charleston	F. S. Royster Guano Co.	-
Charleston	Charleston	V-C Chemical Co. (Mobil)	-
Florence	--	F. S. Royster Guano	-
Greenville	Greenville	V-C Chemical Co. (Mobil)	-
Hartsville	--	Internat. Minerals & Chem. Corp.	-
Jericho	Charleston	Kerr-McGee Chemical Corp.	100,000
Spartanburg	--	Internat. Minerals & Chem. Corp.	-
SOUTH DAKOTA			
Alexandria	--	Farmers Union Oil Co.	-
Howard	--	Peavey Co., Producer Service	-

State City	SMSA	Company	Capacity, Tons per Year
TENNESSEE			
Chattanooga	Chattanooga	A. D. Adair & McCarty Bros., Inc.	30,000
Humboldt	--	Federal Chemical Co.	-
Memphis	Memphis	USS Agri-Chemical, Inc., Div. U.S. Steel Corp.	-
Memphis	Memphis	V-C Chemical Co. (Mobil)	-
Mt. Pleasant	--	V-C Chemical Co. (Mobil)	-
Nashville	Nashville	USS Agri-Chemical, Inc., Div. U.S. Steel Corp.	-
Nashville	Nashville	Federal Chem. Co., Inc.	-
Nashville	Nashville	W. R. Grace & Co.	-
TEXAS			
Bonham	--	Hi-Yield Fertilizer Co.	40,000
Bonham	--	The Fertilome People	-
Comanche	--	Central Texas Fertilizer Co., Inc.	15,000
Dalhart	--	J. Eddie Jones Fertilizer Co.	-
Dallas	Dallas	USS Agri-Chemical, Inc., Div. U.S. Steel Corp.	-
Dallas	Dallas	Dallas Laboratories	-
Dallas	Dallas	Southwest Fertilizer Co.	3,000
Fort Worth	Fort Worth	Inter. Min. & Chem., Inc.	-
Freeport	Houston	Red Barn Chem., Inc.	90,000
Houston	Houston	USS Agri-Chemical, Inc., Div. U.S. Steel Corp.	-
Houston	Houston	Swift & Co.	-
Jacksonville	--	Jacksonville Fertilizer Co.	15,000
Keller	Fort Worth	Tacco Co.	10,000
Littlefield	--	Nipak, Inc.	30,000
Nacogdoches	--	Texas Farm Products Co.	75,000
Pasadena	Houston	Olin Mathieson Chem. Corp.	-

State City	SMSA	Company	Capacity, Tons per Year
TEXAS (cont.)			
Pittsburg	--	Nipak, Inc.	-
Plainview	--	The Best Fertilizer Co. of Texas	-
Sulphur Springs	--	Southern Farm Supply Assn.	50,000
Sulphur Springs	--	Coastal Chemical Corp.	-
Texarkana	Texarkana	Farmers Fertilizer Co.	20 tons/hr
Texarkana	Texarkana	International Minerals & Chemicals	-
Texas City	Galveston-Texas City	Smith-Douglass Co., Inc.	-
Tyler	Tyler	East Texas Products Co.	-
UTAH			
Midvale	Salt Lake City	Mineral Fertilizer Co.	25,000
VERMONT			
Bradford	--	Kerr-McGee Chemical Corp.	-
VIRGINIA			
Alexandria	Washington, D. C.	Herbert Bryant, Inc.	-
Chesapeake	Norfolk-Portsmouth	W. R. Grace & Co.	-
Chesapeake	Norfolk-Portsmouth	Reliance Fertilizer & Lime Corp.	25,000
Chesapeake	Norfolk-Portsmouth	F. S. Royster Guano Co.	-
Chesapeake	Norfolk Portsmouth	Southern States Co-op	80,000
Chilhowie	--	The Vance Co., Inc.	20,000
Norfolk	Norfolk-Portsmouth	Chas. W. Priddy & Co., Inc.	65,000
Norfolk	Norfolk-Portsmouth	Smith-Douglass Co., Inc.	-
Norfolk	Norfolk-Portsmouth	Weaver Fertilizer Co., Inc.	60,000
Norfolk	Norfolk-Portsmouth	Swift & Co.	-
Richmond	Richmond	Richmond Guano Co.	60,000

State City	SMSA	Company	Capacity, Tons per year
VIRGINIA (cont.)			
Richmond	Richmond	V-C Chemical Co. (Mobil)	-
Suffolk	--	V-C Chemical Co. (Mobil)	-
WASHINGTON			
Burbank	--	G-W Chemco, Inc.	20,000
Pasco	--	G-W Chemco, Inc.	-
WISCONSIN			
Cumberland	--	Cumberland Farmers Union Co-op	-
Green Bay	Green Bay	Northwest Co-op Mills	-
Green Bay	Green Bay	F. S. Services Inc.	25,000
Hillsboro	--	Midwestern Farm Fertilizers	20,000
Junea	--	Western Dodge Co. Co-op	-
Kenosha	Kenosha	The N. S. Koos & Sons Co.	60,000
Madison	Madison	Swift & Co.	-
Madison	Madison	F. S. Royster Guano Co.	-
Marshall	Madison	Dairyland Fertilizers, Inc.	30,000
Prairie Du Chien	--	Wisconsin Farmco Service Co-op	120,000
Stevens Point	--	Midwestern Farm Fertilizers, Inc.	30,000
Whitewater	--	Federal Chemical Co.	-
WYOMING			
Glenrock	--	American Humates, Inc.	10,000
Worland	--	Wyoming Pure Seed Growers, Inc.	-

F.14 Phosphoric Acid

Phosphoric acid is produced in two distinct processes. The wet process output is consumed primarily in the fertilizer industry and accounted for 78 percent of the phosphoric acid produced in 1967. Wet process acid is produced from phosphate rock treated with sulfuric acid. Nitric acid or hydrochloric acid may be used, but these are not used extensively in the United States at the present time. Much of the wet process acid is produced and used at sites where triple superphosphate or ammonium phosphate is manufactured; however in recent years, the quality of the acid has improved so that its handling and shipment are less difficult.

The other commercial process for manufacturing phosphoric acid is the thermal process; it is also referred to as the electric furnace or phosphorus-burning process. Thus, the acid is produced by burning elemental phosphorus in air. Since thermal process acid contains fewer impurities than wet process acid, the thermal acid is used in plasticizers, detergents, fire retardants, pharmaceuticals, and food grade acid.

Strength of acid produced by the wet and thermal processes usually approximate 54 percent phosphorus pentoxide (P_2O_5); superphosphoric acid ranges to 80 percent P_2O_5.

Wet acid production amounted to 3,752,000 tons of P_2O_5 in 1967.(40) Wet acid capacity as of January 1, 1968, was 5,700,000 tons of P_2O_5 and is expected to reach 6,500,000 tons by the end of 1969.(41) Of the 49 wet process plants, 17 are in Florida and 14 are in other States, including Louisiana (4 plants) and Illinois (7 plants) which are the second and third largest producers(38) (see table F-25). Geographical distribution in the United States is shown in figure F-22; 39 percent of all plants are within SMSA's.

Thermal acid production in 1967 was 1,039,000 tons of P_2O_5.(40) Some 24 plants are located in 13 States(38) (see table F-26); geographical distribution of plants is shown in figure F-23; 50 percent of the plants are within SMSA's.

Pollutants from the wet process are silicon tetrafluoride, hydrogen fluoride, sulfur dioxide, and acid mists. Emission quantities depend on the type of processing equipment utilized. Normally, a wet scrubber is used for control; efficiency of 99+ percent is required to restrict emissions to 0.10 pounds or less of fluoride per ton of P_2O_5.

The principal emission from the thermal process is acid aerosols. Aerosol abatement can be accomplished by wet scrubbers (packed and open tower, or venturi), but high collection efficiency may not be obtained. Inertial separators are sometimes used in conjunction with scrubbers. A venturi scrubber followed by an inertial separator can recover up to 99.9 percent of the acid aerosol at pressure drops of 35-60 inches of water.(42) Metal and glass fiber mist eliminators can also achieve 99.9 percent efficiency.

Hydrogen sulfide is generated intermittently in the preparation of food-grade acid. By venting the acid-treater effluent to the phosphorus furnace, the hydrogen sulfide can be converted to sulfur dioxide and the odor can thus be eliminated.

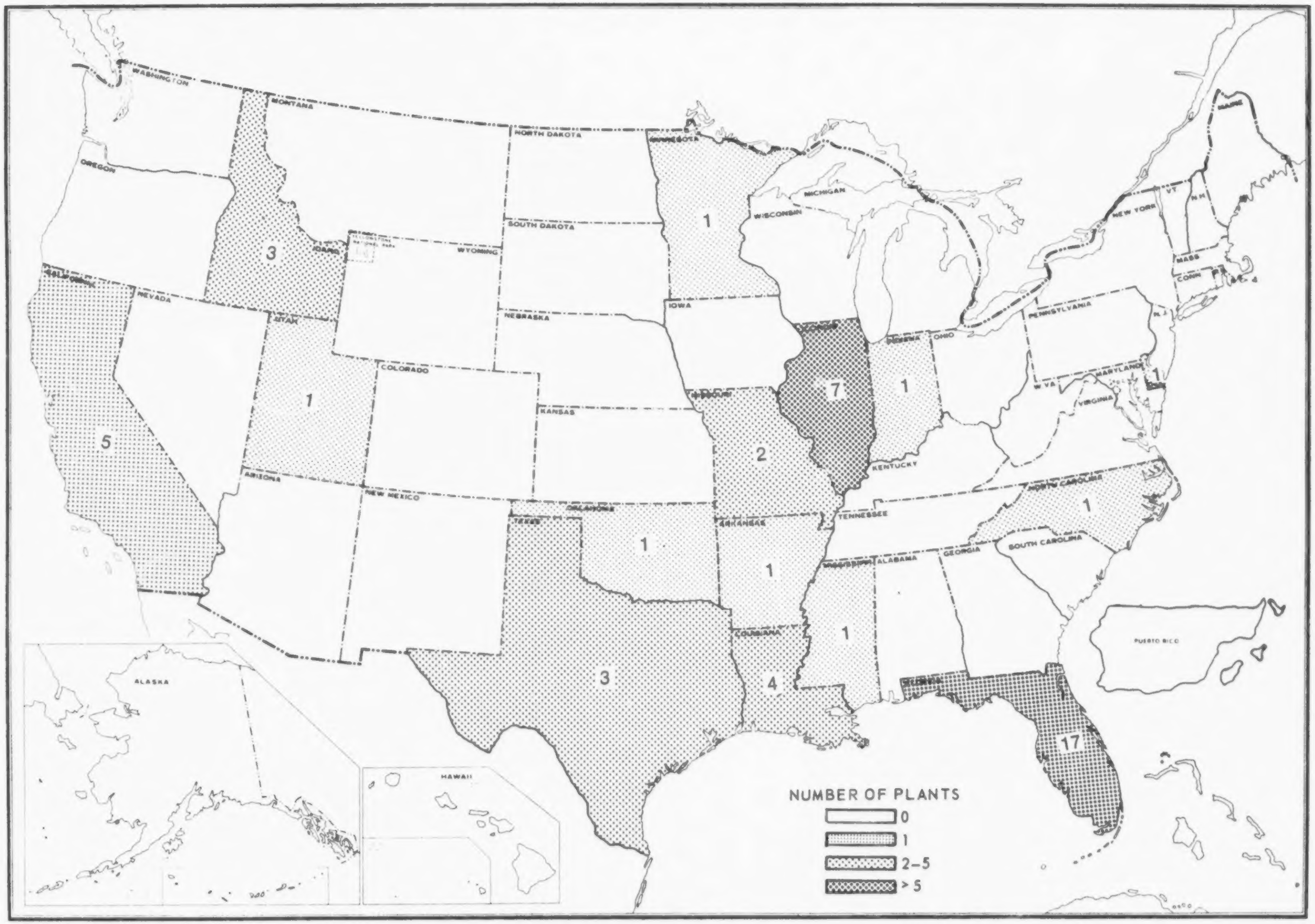
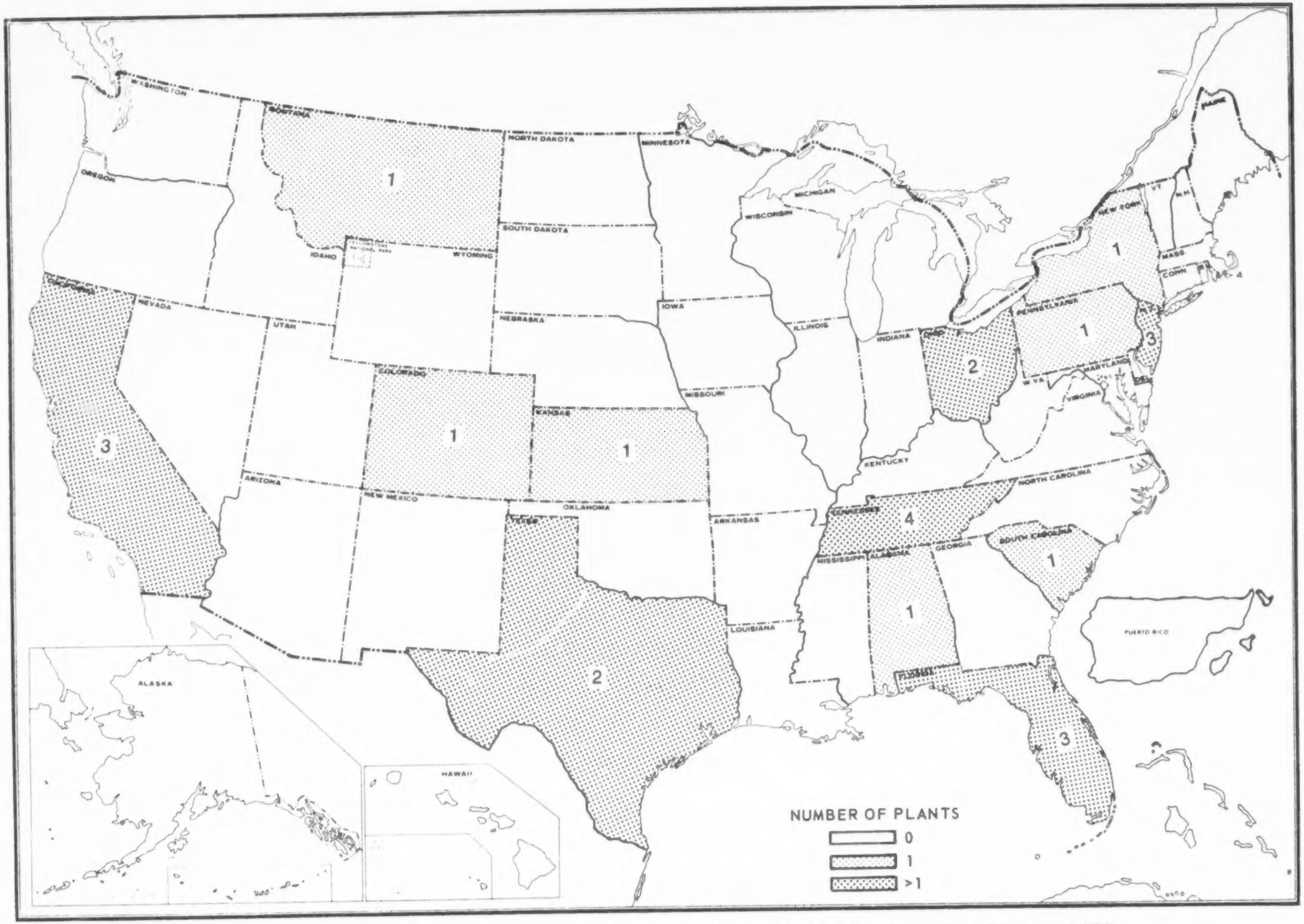

WASHINGTON
OREGON
MONTANA
IDAHO
3
NORTH DAKOTA
SOUTH DAKOTA
WYOMING
NEVADA
CALIFORNIA
5
UTAH
1
COLORADO
NEBRASKA
KANSAS
ARIZONA
NEW MEXICO
OKLAHOMA
1
TEXAS
3
MINNESOTA
1
IOWA
MISSOURI
2
ARKANSAS
1
LOUISIANA
4
WISCONSIN
MICHIGAN
ILLINOIS
7
INDIANA
1
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
1
ALABAMA
GEORGIA
FLORIDA
17
SOUTH CAROLINA
NORTH CAROLINA
1
VIRGINIA
W. VA.
MARYLAND
1
PENNSYLVANIA
N.J.
NEW YORK
VT
N.H.
MAINE
MASS
CONN
R.I.
PUERTO RICO
ALASKA
HAWAII
NUMBER OF PLANTS
0
1
2–5
> 5

Figure F-22. Wet-process phosphoric acid plants, 1968.



WASHINGTON
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WISCONSIN
MICHIGAN
ILLINOIS
INDIANA
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KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
W. VA.
MARYLAND
PENNSYLVANIA
NEW YORK
VT
N.H.
MAINE
MASS
CONN
ALASKA
HAWAII
PUERTO RICO
1
3
1
1
2
1
1
3
2
4
1
1
1
3
NUMBER OF PLANTS
0
1
>1

Figure F-23. Thermal-process phosphoric acid and superphosphoric acid plants, 1968.

Table F-25. PHOSPHORIC ACID PLANTS (Wet Process)
June 1968

State City	SMSA	Company	Capacity, P_2O_5 Tons per Year
ARKANSAS			
Helena	--	Arkla Chemical Corp.	-
CALIFORNIA			
Bena	Bakersfield	AFC, Inc.	20,000
Dominguez	Los Angeles-Long Beach	Western States Corp.	12,000
Helm	Fresno	Valley Nitrogen Products, Inc.	49,000
Lathrop	Stockton	The Best Fertilizers Corporation	18,000
Trona	San Bernardino-Riverside-Ontario	American Potash & Chemical Corp.	5,000
DELAWARE			
North Claymont	Wilmington	Allied Chemical Corp.	33,000
FLORIDA			
Bonnie	--	International Minerals & Chemical Corp., Agricultural Operations Div.	500,000
Bartow	--	USS Agri-Chemicals, Inc., U.S. Steel Corp.	275,000
Bartow	--	W. R. Grace and Co., Agricultural Products Div.	165,000
Bartow	--	Swift and Co., Phosphate Center	90,000
Brewster	--	American Cyanamid Co., Agricultural Div.	200,000
Fort Meade	--	USS Agri-Chemical, Inc., U.S. Steel Corp.	165,000
Green Bay	--	Farmland Industries	110,000
Hamilton	Fort Lauderdale-Hollywood	Occidental Petroleum Co.	550,000
Mulberry	--	F. S. Royster Guano Co.	25,000
Nichols	--	Mobil Chemical Co., Div. Mobil Oil Corp.	230,000

State City	SMSA	Company	Capacity, P_2O_5 Tons per Year
FLORIDA (cont.)			
Pierce	--	Consumers Cooperative Association	75,000-100,000
Piney Point	--	Borden Chemical Co., Smith Douglass Div.	140,000
Plant City	Tampa-St. Petersburg	Borden Chemical Co., Smith Douglass Div.	-
Plant City	Tampa-St. Petersburg	Central Phosphates	100,000
South Pierce	--	Agrico Chemical Co., Div. Continental Oil Co.	227,500
Tampa	Tampa-St. Petersburg	U.S. Phosphoric Products, Div. Tennessee Corp.	360,000
White Springs	--	Occidental Corp. of Florida	250,000
IDAHO			
Conda	--	El Paso Products Co.	90,000
Kellogg	--	Collier Carbon and Chemical Co.	33,000
Pocatello	--	J. R. Simplot Co.	270,000
ILLINOIS			
Depue	--	New Jersey Zinc Co.	130,000
East St. Louis	St. Louis	Allied Chemical Corp.	50,000
Joliet	Chicago	Olin Mathieson Chemical Corp., Chemicals Div.	125,000
Marseilles	--	Hooker Chemical Corp., Farm Chemicals Div.	200,000
Morris	--	Des Plaines Chemical Co.	90,000
Streator	--	Borden Chemical Co., Div. Smith-Douglass Co.	33,000
Tuscola	--	U.S. Industrial Chemicals Co., Div. National Distillers & Chemical Corp.	30,000
INDIANA			
Gary	Gary-Hammond-East Chicago	Mobil Chemical Co., Div. Mobil Oil Corp.	30,000
LOUISIANA			
Covent	--	Freeport Chemical Co.	600,000
Donaldsonville	--	Gulf Oil Corp.	-

State City	SMSA	Company	Capacity, P_2O_5 Tons per Year
LOUISIANA (cont.)			
Geismar	--	Allied Chemical Corp., Nitrogen Div.	180,000
Taft	--	Hooker Chemical Corp.	100,000
MINNESOTA			
Pine Bend	Minneapolis-St. Paul	Cenex, Inc.	54,000
MISSISSIPPI			
Pascaugoula	--	Coastal Chemical Corp.	50,000
MISSOURI			
Joplin	--	Farmers Chemical Co.	50,000
Joplin	--	W. R. Grace and Co.	50,000
NORTH CAROLINA			
Aurora	--	Texas Gulf Sulfur Co.	375,000
OKLAHOMA			
Tulsa	Tulsa	Nipak, Inc.	30,000
TEXAS			
Houston	Houston	Phosphates Chemicals, Inc.	100,000
Pasadena	Houston	Olin Mathieson Chemical Corp., Agricultural Div.	200,000
Pasadena	Houston	Phillips Chemical Co.	50,000
UTAH			
Garfield	Salt Lake City	Stauffer Chemical Co., Fertilizer Div.	100,000

Table F-26. PHOSPHORIC ACID AND SUPERPHOSPHORIC ACID PLANTS (Thermal Process)
June 1968

State City	SMSA	Company	Phosphorus Production or Burning Capacity, Tons per Year
ALABAMA			
Muscle Shoals	--	Tennessee Valley Authority	37,600
CALIFORNIA			
Newark	San Francisco-Oakland	F M C Corp., Inorganic Chemical Div.	-
Long Beach	Los Angeles-Long Beach	Monsanto Co.	-
Richmond	San Francisco-Oakland	Stauffer Chemical Co., Fertilizer Div.	-
COLORADO			
Pueblo	Pueblo	CF&I Steel Corp. (idle)	-
FLORIDA			
Nichols	--	Mobil Chemical Co., Div. Mobil Oil Corp.	6,000
Pierce	--	Agrico Chemical Co., Div. Continental Oil Co.	40,000
Tarpon Springs	Tampa-St. Petersburg	Stauffer Chemical Co.	15,000
KANSAS			
Lawrence	--	F M C Corp., Inorganic Chemical Div.	-
MONTANA			
Butte	--	Stauffer Chemical Co.	30,000
NEW JERSEY			
Carteret	--	Agrico Chemical Co., Div. Continental Oil Co.	40,000
Carteret	--	F M C Corp., Inorganic Chemical Div.	-
Kearny	Jersey City	Monsanto Co.	-
NEW YORK			
Niagara Falls	Buffalo	Hooker Chemical Corp., Industrial Chemical Div.	6,000

State City	SMSA	Company	Phosphorus Production or Burning Capacity, Tons per Year
OHIO			
Fernald	Cincinnati	Mobil Chemical Co., Div. Mobil Oil Corp.	-
Addyston	Cincinnati	Monsanto Co.	-
PENNSYLVANIA			
Morrisville	Philadelphia	Stauffer Chemical Co.	-
SOUTH CAROLINA			
Charleston	Charleston	Mobil Chemical Co., Div. Mobil Oil Corp.	10,000
TENNESSEE			
Columbia	--	Hooker Chemical Corp., Industrial Chemical Div.	68,400
Columbia	--	Mobil Chemical Co., Div. Mobil Oil Corp.	20,000
Columbia	--	Monsanto Company	110,000
Columbia	--	Stauffer Chemical Co.	80,000
TEXAS			
Brownfield	--	Goodpasture Grain and Milling Co.	19,000
Dallas	Dallas	Hooker Chemical Corp., Industrial Chemical Div.	-

F.15 Pulp Mills

Between the sulfate (kraft) and sulfite processes, which account for nearly three-quarters of total pulp output in the United States, kraft production is approximately eight times larger. The major distinction between these two is that the kraft process uses sodium sulfide and sodium hydroxide in water to dissolve lignin from the cellulose in the wood chips, whereas the sulfite process uses sulfur dioxide, sulfurous acid, and bisulfites of alkaline bases. Subsequent chemical recovery processes vary accordingly; there may be no recovery at all when calcium-based sulfite cooking processes are used.

The kraft process is carried on at 113 locations; 28 locations (or 25 percent) are within SMSA's(44) (see table F-27). Production for 1967 was 22,593,350 tons;(43) individual mill capacity ranges from less than 100 tons to 2,600 tons per day. Of the 47 sulfite mills, 7 (or 15 percent) are within SMSA's(44) (see table F-28). Production in 1967 was 2,669,113 tons;(43) individual mill capacities range from less than 100 tons to 850 tons per day. Most of the sulfite mills are situated in the Northern States while most of the kraft process mills are in the Southern States. Geographical distributions of kraft and sulfite mills are displayed in figures F-24 and F-25 respectively.

Both kraft and sulfite processes emit odors. Odors emitted from sulfite mills are usually less in quantity and less obnoxious than those emitted from kraft mills. Efficient operation and recovery of chemicals

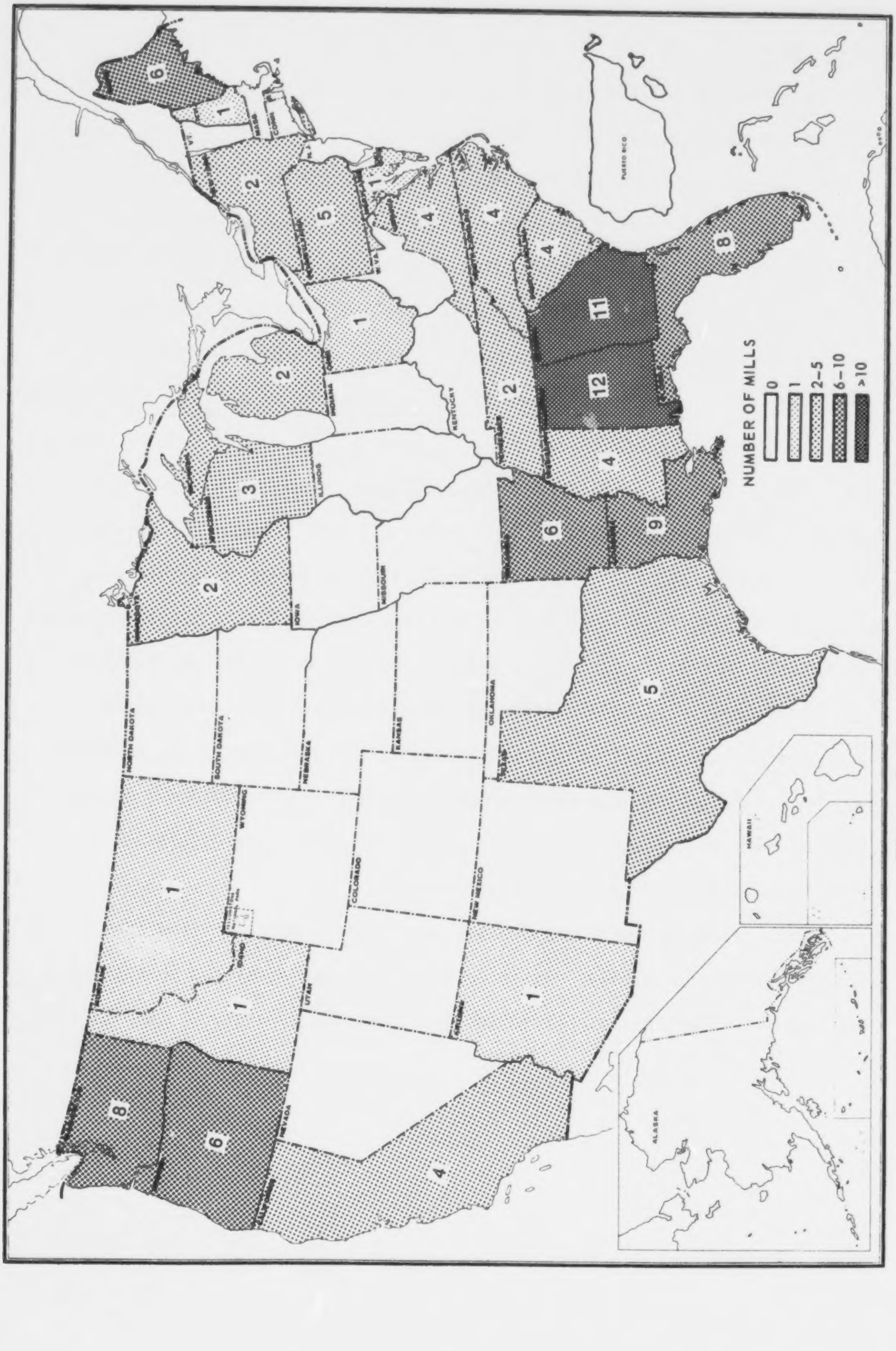
NUMBER OF MILLS
0
1
2–5
6–10
>10
8
6
1
1
4
2
3
2
1
5
2
1
6
4
4
4
1
2
12
11
8
9
6
4
5
1
1
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
WYOMING
COLORADO
NEW MEXICO
UTAH
NEVADA
IDAHO
IOWA
MISSOURI
ILLINOIS
INDIANA
KENTUCKY
ALASKA
HAWAII
PUERTO RICO

Figure F-24. Kraft pulp mills, 1968.

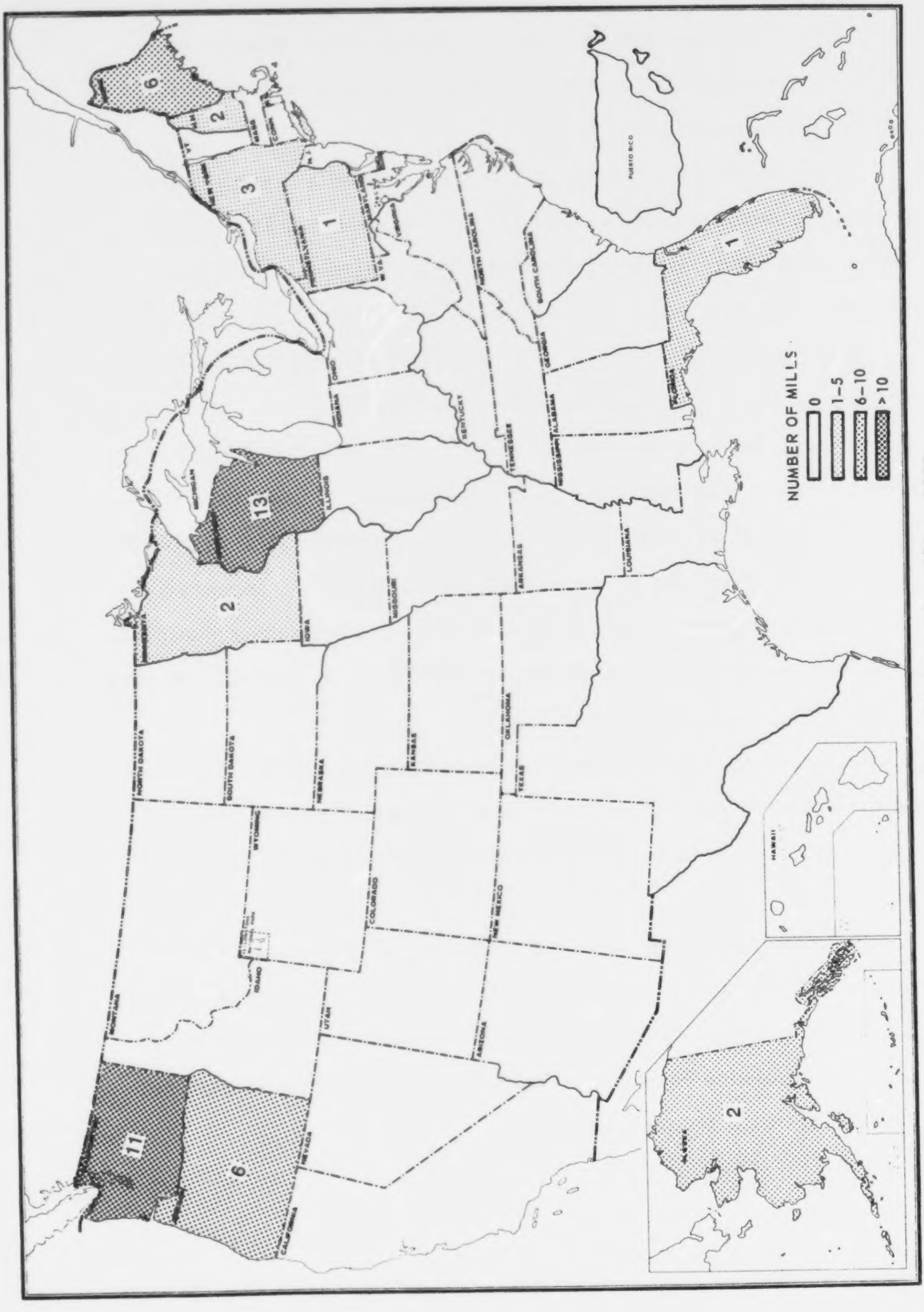
NUMBER OF MILLS
0
1–5
6–10
> 10
11
6
2
13
6
2
3
1
1
2

Figure F-25. Sulfite pulp mills, 1968.

is essential to reduce air pollutant emissions; sulfur dioxide from the sulfite process can be recovered through condensation, scrubbing, and separation operations.

Particulates are emitted from the kraft process at several points, such as the recovery furnace, smelt-dissolving tank, and lime kiln. Methods of control include electrostatic precipitators, scrubbers, demisters, and to a lesser extent, inertial separators, and filters.

Major gaseous emissions arise from digester blow systems, evaporators, recovery furnaces, and to a lesser extent, from lime kilns. The malodorous gases include hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and sulfur dioxide. Two routes are generally employed in combating the problem: converting chemicals into less objectionable sulfur compounds, and recycling within the system. Black liquor oxidation, incineration, alkaline and chlorine scrubbing, air and catalytic oxidation, absorption, waste heat recovery, process changes or modifications, and good operating procedures are means of control.

Odor masking can be accomplished by introducing substances within the mill which render the effluents less noticeable; however, results are difficult to evaluate, and other adverse effects of the pollutants persist.

Abatement of odor has been a well-recognized problem since the first kraft mill began operation almost eighty years ago. The process has many interdependent operations which limit the processing flexibility that might otherwise be used to reduce emissions. Additional research is needed to solve the problem.

Table F-27. PULP MILLS - KRAFT
1968

State City	SMSA	Company	Capacity, tons/day
ALABAMA			
Brewton	--	Container Corp. of America	700
Coosa Pines	--	Kimberly-Clark Corp.	600
Demopolis	--	Gulf States Paper Corp.	400
Jackson	--	Allied Paper Corp.	450
Mahrt	--	Georgia Kraft Co.	800
Mobile	Mobile	International Paper Co.	1015
Mobile	Mobile	Scott Paper Co.	1350
Montgomery	--	Union Camp Corp.	860
Naheola	--	American Can Co.	900
Selma	--	Hammermill Paper Co.	400
Thomasville	--	MacMillan Bloedel United, Inc.	900
Tuscaloosa	Tuscaloosa	Gulf States Paper Corp.	450
ARIZONA			
Snowflake	--	Southwest Forest Industries, Inc.	320
ARKANSAS			
Ashdown	--	Nekoosa-Edwards Paper Co.	40
Camden	--	International Paper Co.	750
Crossett	--	Georgia-Pacific Corp. Mill No. 1	640
		Mill No. 2	400
Morrilton	--	Arkansas Kraft Corp.	300
Pine Bluff	Pine Bluff	Dierks Paper Co.	200
Pine Bluff	Pine Bluff	International Paper Co.	1150

State City	SMSA	Company	Capacity, tons/day
CALIFORNIA			
Anderson	--	Kimberly-Clark Corp.	150
Antioch	San Francisco-Oakland	Fiberboard Corp.	500
Arcata	--	Crown Simpson Pulp Co.	500
Samoa	--	Georgia-Pacific Corp.	500
FLORIDA			
Fernandina Beach	--	Container Corp. of America	770
Foley	--	Buckeye Cellulose Corp.	280,000 tons annually
Jacksonville	Jacksonville	Alton Box Board Co.	675
Jacksonville	Jacksonville	St. Regis Kraft Div.	1370
Palatka	--	Hudson Pulp & Paper Co.	950
Panama City	--	International Paper Co.	1900
Pensacola	Pensacola	St. Regis Kraft Div. East Mill West Mill	600 300
Port St. Joe	--	St. Joe Paper Co.	1200
GEORGIA			
Augusta	Augusta	Continental Can Co., Inc.	350
Brunswick	--	Brunswick Pulp & Paper Co.	1175
Cedar Springs	--	Great Northern Paper Co.	1000
Jesup	--	Rayonier, Inc.	675
Macon	Macon	Georgia Kraft Co.	825
Port Wentworth	--	Continental Can Co., Inc.	625
Riceboro	--	Interstate Paper Corp.	450
Rome	--	Georgia Kraft Co.	1500
St. Marys	--	Gilman Paper Co.	900

State City	SMSA	Company	Capacity, tons/day
GEORGIA (cont.)			
Savannah	Savannah	Union Camp Corp.	2600
Valdosta	--	Owens-Illinois, Inc.	770
IDAHO			
Lewiston	--	Potlatch Forests, Inc.	750
LOUISIANA			
Bastrop	--	International Paper Co.	1100
Bogalusa	--	Crown Zellerbach Corp.	1350
Elizabeth	--	Calcasieu Paper Co., Inc.	240
Hodge	--	Continental Can Co., Inc.	500
Pineville	--	Pineville Kraft Corp.	850
Port Hudson	Baton Rouge	Louisiana Forest Products Corp.	510
St. Francisville	--	Crown Zellerbach Corp.	500
Springhill	--	International Paper Co.	1625
West Monroe	Monroe	Olinkraft, Inc.	-
MAINE			
Cumberland Mills	Portland	S. D. Warren	250
Jay	--	International Paper Co.	500
Lincoln	--	Standard Packaging Corp.	210
Old Town	--	Penobscot Co.	350
Rumford	--	Oxford Paper Co.	550
Woodland	--	St. Croix Paper Co.	500
MARYLAND			
Luke	--	West Virginia Pulp & Paper Co.	800

State City	SMSA	Company	Capacity, tons/day
MICHIGAN			
Filer City	--	Packaging Corp. of America	165
Muskegon	Muskegon-Muskegon Heights	S. D. Warren	225
MINNESOTA			
International Falls	--	Boise Cascade Corp.	125
Cloquet	--	Wood Conversion Co.	-
MISSISSIPPI			
Monticello	--	St. Regis Kraft Div.	1690
Moss Point	--	International Paper Co.	660
Natchez	--	International Paper Co.	950
Vicksburg	--	International Paper Co.	1200
MONTANA			
Missoula	--	Hoerner Waldorf Corp. of Montana	1200
NEW HAMPSHIRE			
Berlin	--	Brown Co.	700
NEW YORK			
Fort Edward	--	Sagamore Pulp Corp.	75
Ticonderoga	--	International Paper Co.	190
NORTH CAROLINA			
Canton	--	Champion Papers Div.	1250
Plymouth	--	Weyerhaeuser Co.	1150
Riegelwood	--	Riegel Paper Corp.	1010
Roanoke Rapids	--	Albemarle Paper Co.	900

State City	SMSA	Company	Capacity, tons/day
OHIO			
Chillicothe	--	Mead Corp.	570
OREGON			
Albany	--	Western Kraft Corp.	500
St. Helens	--	Boise Cascade Corp.	385
Springfield	Eugene	Weyerhaeuser Co.	1150
Toledo	--	Georgia-Pacific Corp.	1000
Wauna	--	Crown Zellerbach Corp.	600
Gardiner	--	International Paper Co.	545
PENNSYLVANIA			
Johnsonburg	--	New York & Pennsylvania Co., Inc.	160
Roaring Springs	Altoona	Combined Paper Mills, Inc.	180
Spring Grove	York	Glatfelter, P. H. Co.	500
Tyrone	Altoona	West Virginia Pulp & Paper Co.	152
Williamsburg	Altoona	West Virginia Pulp & Paper Co.	160
SOUTH CAROLINA			
Catawba	--	Bowaters Carolina Corp.	400
Charleston	Charleston	West Virginia Pulp & Paper Co.	1534
Florence	--	South Carolina Industries, Inc.	600
Georgetown	--	International Paper Co.	1650
TENNESSEE			
Calhoun	--	Bowaters Southern Paper Corp.	450
Counce	--	Tennessee River Pulp & Paper Co.	700

State City	SMSA	Company	Capacity, tons/day
TEXAS			
Evadale	--	Eastex, Inc.	820
Houston	Houston	Southland Paper Mills, Inc.	650
Lufkin	--	Southland Paper Mills, Inc.	300
Orange	Beaumont-Port Arthur-Orange	Owens-Illinois, Inc.	-
Pasadena	Houston	Champion Papers Div.	800
VIRGINIA			
Covington	--	West Virginia Pulp & Paper Co.	1060
Franklin	--	Union Camp Corp.	1040
Hopewell	--	Continental Can Co.	800
West Point	--	Chesapeake Corp. of Virginia	1050
WASHINGTON			
Camas	--	Crown Zellerbach Corp.	780
Everett	Seattle-Everett	Simpson Lee Paper Co.	80
Everett	Seattle-Everett	Weyerhaeuser Co.	360
Longview	--	Longview Fibre Co.	1600
Longview	--	Weyerhaeuser Co.	650
Port Townsend	--	Crown Zellerbach Corp.	420
Tacoma	Tacoma	St. Regis Kraft Div.	906
Wallula	--	Boise Cascade Corp.	410
WISCONSIN			
Kaukauna	--	Thilmany Pulp & Paper Co.	360
Mosinee	--	Mosinee Paper Mills Co.	200
Nekoosa	--	Nekoosa-Edwards Paper Co.	310

Table F-28. PULP MILLS - SULFITE
1968

State City	SMSA	Company	Capacity tons/day
ALASKA			
Ketchikan	--	Ketchikan Pulp Co.	620
Sitka	--	Alaska Lumber & Pulp Co., Inc.	500
FLORIDA			
Fernandina Beach	--	Rayonier, Inc.	375
MAINE			
Augusta	--	Hudson Pulp & Paper Corp.	250
Brewer	--	Standard Packaging Corp.	172
Bucksport	--	St. Regis Printing Paper Div.	125
Millinocket	--	Great Northern Paper Co.	500
Old Town	--	Penobscot Co.	200
Winslow	--	Scott Paper Co.	415
MINNESOTA			
Cloquet	--	Northwest Paper Co.	115
International Falls	--	Boise Cascade Corp.	180
NEW HAMPSHIRE			
Groveton	--	Groveton Papers Co.	425
Lincoln	--	Franconia Paper Corp.	90
NEW YORK			
Carthage	--	Island Paper Co.	40
Deferiet	--	St. Regis Printing Paper Div.	100
Norfolk	--	Northland Paper Co., Inc.	-

State City	SMSA	Company	Capacity, tons/day
OREGON			
Coos Bay	--	Coos Head Timber Co.	90
Lebanon	--	Crown Zellerbach Corp.	105
Newberg	--	Publishers' Paper Co.	200
Oregon City	Portland	Publishers' Paper Co.	150
Salem	Salem	Boise Cascade Corp.	190
West Linn	--	Crown Zellerbach Corp.	200
PENNSYLVANIA			
Johnsonburg	--	New York & Pennsylvania Co., Inc.	110
WASHINGTON			
Bellingham	--	Georgia-Pacific Corp.	470
Camas	--	Crown Zellerbach Corp.	420
Cosmopolis	--	Weyerhaeuser Co.	350
Everett	Seattle-Everett	Scott Paper Co.	850
Everett	Seattle-Everett	Weyerhaeuser Co.	350
Hoquiam	--	Rayonier,Inc.	400
Longview	--	Weyerhaeuser Co.	350
Millwood	Spokane	Inland Empire Paper Co.	42
Port Angeles	--	Fiberboard Corp.	65
Port Angeles	--	Rayonier, Inc.	400
Vancouver	--	Boise Cascade Corp.	180
WISCONSIN			
Appleton	--	Consolidated Papers, Inc.	155
Brokaw	--	Wausau Paper Mills Co.	145
Green Bay	Green Bay	American Can Co.	145

State City	SMSA	Company	Capacity, tons/day
WISCONSIN (cont.)			
Green Bay	Green Bay	Charmin Paper Products Co.	-
Kimberly	--	Kimberly-Clark Corp.	100
Marinette	--	Scott Paper Co.	50
Oconto Falls	--	Scott Paper Co.	110
Park Falls	--	Kansas City Star Co.	115
Peshtigo	--	Badger Paper Mills, Inc.	90
Port Edwards	--	Nekoosa-Edwards Paper Co.	200
Rhinelander	--	St. Regis Rhinelander Div.	110
Rothschild	--	American Can Co.	180
Wisconsin Rapids	--	Consolidated Papers, Inc.	135

F.16 Rendering

There are two basic types of rendering plants: those that reduce edible materials and those that reduce inedible materials. Generally speaking, rendering of edibles constitutes only a small portion of the total industry. In Los Angeles County, for instance, only 10 percent of the total animal matter rendered is edible;(45) 90 percent are inedibles rendered at scavenger plants (58 percent) and packing plants (32 percent).

The methods used to render both edibles and inedibles are similar. A phase separation method yields fats, water, and solids when feedstocks are heated either directly or indirectly with steam. The major differences between rendering edibles and inedibles are due to the composition and freshness of the materials handled; edible materials, the more select portions of the animals, are usually much fresher than the inedible materials.

A list of the 920 rendering establishments in States that were participating in the cooperative State/Federal Salmonella Control Program on September 30, 1968, is presented herein(46) (see table F-29); 48 percent of the sites are within SMSA's. Geographical distribution of the plants is shown in figure F-26.

Plants are usually located in or near cities; the higher number per city is in the Midwest and far western part of the United States. For example, Los Angeles County has 16; Cook County, Illinois, has 12; Bexar County, Texas, has 8; and St. Louis, Missouri, has 7 plants.

The major air contaminants generated from rendering plants are odors. The odors generated by edible rendering processes are relatively minor compared to those from inedible rendering processes, but they can

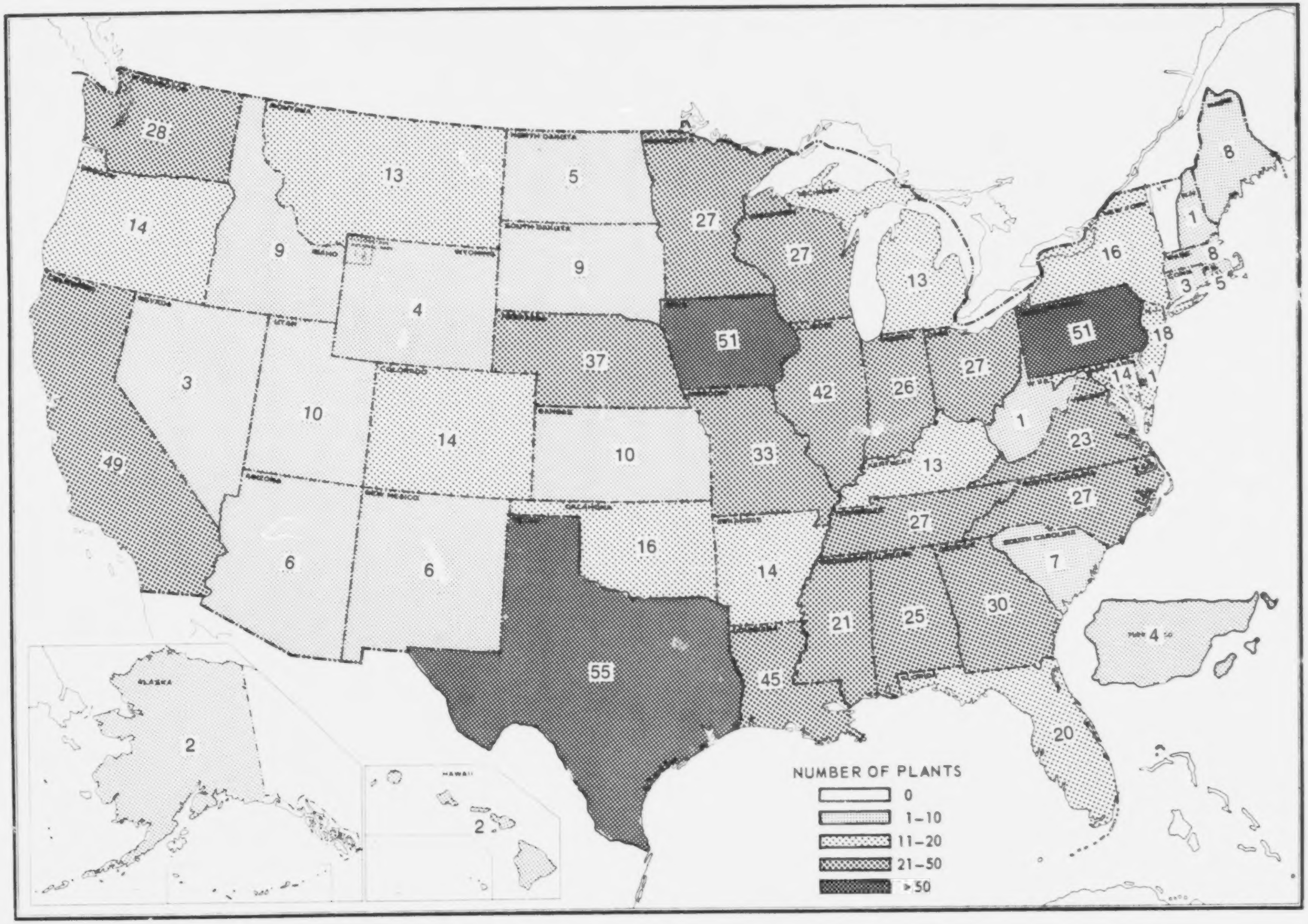
28
14
13
9
5
9
4
3
10
14
37
10
49
6
6
16
55
27
51
27
42
33
14
45
13
26
13
27
21
25
30
27
27
1
23
7
20
16
51
18
14
1
8
1
8
3
5
4
2
2
NUMBER OF PLANTS
0
1-10
11-20
21-50
>50

Figure F-26. Rendering and fish reduction plants, 1968.

still be an air pollution problem. In addition to odor contaminants, dust and smoke can be significant problems at fish canneries and fish reduction plants. The dust is created in driers and conveyors, and the smoke comes mostly from direct-fired fish-meal driers.

The sources of odors in fish canneries and fish reduction plants are reduction cookers, edibles cookers, digesters, and evaporators. In edible rendering plants, the odor sources are cookers, air driers, expellers, grease-processing equipment, and cutting and handling of raw materials.

The principal equipment used to control reduction plant odors are condensers and afterburners installed either in combination or separately. In a well-controlled rendering plant, the vapors from the cookers are passed through a heat exchanger in which condensable gases are liquified and deposited in the sewer, while the noncondensables are burned in an incinerator, afterburner, or boiler. Similarly, vapors from expellers and perculators can be burned in an incinerator. In addition, the air from the various sections of the plant may be scrubbed in a soda ash-water solution scrubber.

To date, little control equipment has been used in rendering plants. Many plants have no controls on their cookers, which are the source of the bulk of the odors. A barometric or direct contact condenser is a fairly effective means of control if the condensing water and condensate are piped into a closed sewer. In water shortage areas, surface condensers are required. Venting the noncondensables from either type condenser to an afterburner or boiler is also an effective control system.

Table F-29. RENDERING PLANTS
September 1968

State City	SMSA	Company
ALABAMA		
Andalusia	--	Beasley Packing
Bessemer	Birmingham	Birmingham Hide & Tallow
Birmingham	Birmingham	Eugster's Groc. & Mkt.
Birmingham	Birmingham	Star Provision
Blountsville	--	Spring Valley Poultry
Dothan	--	Dothan Rendering
Dothan	--	Sunnyland Packing
Florence	--	Florence Packing
Greensboro	--	Greensboro Packing
Geraldine	--	Ralston Purina Rend.
Hanceville	--	Poultry By-Products, Inc.
Heflin	--	Alaga Renderers
Huntsville	Huntsville	Alabama Hide & Tallow Rend.
Leeds	Birmingham	Leeds Packing
Loxley	Mobile	Sars, Inc.
Mobile	Mobile	Haas-Davis Packing
Montgomery	Montgomery	Alabama Renderers, Inc.
Montgomery	Montgomery	Frosty Morn Meats
Montgomery	Montgomery	Swift & Company
Opelika	--	East Alabama Provision
Selma	--	R. L. Zeigler, Inc.
Trussville	Birmingham	Ralston Purina Rend.
Trussville	Birmingham	W. B. Riggins Rendering

State City	SMSA	Company
ALABAMA (cont.)		
Tuscaloosa	Tuscaloosa	R. L. Zeigler, Inc.
Wadley	--	Beaver Creek Renderers
ALASKA		
Anchorage	--	Don Chemical Inc.
Kodiak	--	Zachar Bay Fisheries, Inc.
ARIZONA		
Phoenix	Phoenix	Bootstrap Trading
Phoenix	Phoenix	Cudahy Packing
Phoenix	Phoenix	Maricopa Tallow Works
Phoenix	Phoenix	Phoenix Tallow Works
Safford	--	Heber Nuttals
Tucson	Tucson	Tucson Tallow
ARKANSAS		
Batesville	--	Arkansas Poultry
DeQueen	--	Mountaire Poultry
El Dorado	--	El Dorado Poultry By-Products
Ft. Smith	Fort Smith	Modern Meat Processors
Ft. Smith	Fort Smith	Tankersley Packing
Grannis	--	Lane Poultry
Jonesboro	--	Jonesboro Grease Extractors
Little Rock	Little Rock	C. Finkbeiner Packers
Little Rock	Little Rock	Little Rock Packing
Little Rock	Little Rock	Little Rock Processing
Little Rock	Little Rock	Southern Rendering

State City	SMSA	Company
ARKANSAS (cont.)		
Paris	--	Paris Rendering
Russelville	--	Standard Rendering
Siloam Springs	--	Ozark Poultry Products
CALIFORNIA		
Bakersfield	Bakersfield	Bakersfield Tallow
Brawley	--	Peterson Manufacturing, Inc.
Chico	--	Butte Tallow
Chula Vista	San Diego	Omar Rendering
Emeryville	San Francisco-Oakland	Peterson Manufacturing, Inc.
Eureka	--	Eureka Tallow Works
Florin	Sacramento	Florin Tallow
Fresno	Fresno	Peterson Manufacturing, Inc.
Hanford	--	Cadwell-Martin Meat
Hanford	--	Kings-Tulare Tallow Works
Kerman	Fresno	Baker Commodities, Inc.
Long Beach	Los Angeles-Long Beach	Vancamp Sea Food
Los Angeles	Los Angeles-Long Beach	Baker Commodities, Inc.
Los Angeles	Los Angeles-Long Beach	B & H Processing
Los Angeles	Los Angeles-Long Beach	California Protein Products
Los Angeles	Los Angeles-Long Beach	California Rendering
Los Angeles	Los Angeles-Long Beach	Farmer John Packing
Los Angeles	Los Angeles-Long Beach	Highland Meat
Los Angeles	Los Angeles-Long Beach	Ideal Packing
Los Angeles	Los Angeles-Long Beach	J & M Rendering
Los Angeles	Los Angeles-Long Beach	Peterson Manufacturing,Inc.

State City	SMSA	Company
CALIFORNIA (cont.)		
Los Angeles	Los Angeles-Long Beach	Pride Packing
Los Angeles	Los Angeles-Long Beach	State Packing
Los Angeles	Los Angeles-Long Beach	West Coast Fert. & Rend.
Madera	--	Corpat By-Products, Inc.
Modesto	--	Modesto Tallow
Monterey	--	Hovden Food Products
Moss Landing	--	Santa Cruz Canning
Ontario	San Bernardino-Riverside-Ontario	G & G Freezer
Oxnard	Oxnard-Ventura	J. D. Packing
Petaluma	--	Royal Tallow & Soap
Red Bluff	--	Red Bluff Tallow
Richmond	San Francisco-Oakland	Independent Renderers
Sacramento	Sacramento	Sacramento Rend.
Salinas	--	Salinas Tallow Works
San Diego	San Diego	Peterson Manufacturing, Inc.
San Diego	San Diego	Westgate-California Foods
San Francisco	San Francisco-Oakland	Del Monte Meat
San Francisco	San Francisco-Oakland	Pacific Rendering
San Francisco	San Francisco-Oakland	Royal Tallow & Soap
San Francisco	San Francisco-Oakland	Western Calif. Products
S. San Francisco	San Francisco-Oakland	Swift & Co.
San Jose	San Jose	San Jose Tallow Works
San Luis Obispo	--	San Luis Tallow Works
Terminal Island	Los Angeles-Long Beach	California Marine Cur & Pkg.
Terminal Island	Los Angeles-Long Beach	Pan Pacific Fisheries

State City	SMSA	Company
CALIFORNIA (cont.)		
Terminal Island	Los Angeles-Long Beach	Star-Kist Foods, Inc.
Turlock	--	Peterson Manufacturing, Inc.
Woodland	Sacramento	Woodland By-Products
COLORADO		
Brush	--	Sigman Packing
Denver	Denver	Denver Rendering
Denver	Denver	Litvak Packing
Denver	Denver	National By-Products
Denver	Denver	National Food Stores
Denver	Denver	United Fryer & Stillman
Ft. Morgan	--	American Beef Packers
Grand Junction	--	Grand Valley Rendering
Grand Junction	--	Western Slope Rendering
Greeley	--	Monfort Packing
Loveland	--	Loveland Packing
Pueblo	Pueblo	American Stores Packing
Sterling	--	Platte Valley Rendering
Sterling	--	Sterling Beef
CONNECTICUT		
Bridgeport	Bridgeport-Stamford-Norwalk	Herman Isacs
Columbia	--	Hartford Poultry
W. Haven	New Haven	New Haven Rendering
DELAWARE		
Newark	Wilmington	Smith & Burr's Rend.

State City	SMSA	Company
FLORIDA		
Apalachicola	--	The Fish Meal
Bartow	--	Bartow Processing
Carrabelle	--	Coastal Crab Meat
Doctors Inlet	--	Florida Soap
Fernandina Beach	--	Nassau Fert. & Oil
Fernandina Beach	--	Quinn Menhaden Fisher.
Hallendale	Fort Lauderdale-Hollywood	Tallow Corp.
Jacksonville	Jacksonville	G. L. Lewis Crab Plant
Jacksonville	Jacksonville	Jones-Chambliss Meat
Live Oak	--	Goldkist Poultry
Live Oak	--	Suwanee Packing
Marianna	--	Clark Rendering
Miami Springs	Miami	Florida Processing
Miami Springs	Miami	Tallowmasters, Inc.
Ocala	--	Swift & Co.
Oviedo	Orlando	L. D. Plante, Inc.
Plant City	Tampa-St. Petersburg	Lykes Bros., Inc.
Quincy	--	Frosty-Morn Meat Packers
Tampa	Tampa-St. Petersburg	Ocean Products
Tampa	Tampa-St. Petersburg	Tampa Soap & Chemical
GEORGIA		
Albany	Albany	Albany Tallow
Albany	Albany	Lykes Bros. Packing
Alma	--	D. L. Lee & Sons
Atlanta	Atlanta	Andrews & Simpkins, Inc.

State City	SMSA	Company
GEORGIA (cont.)		
Atlanta	Atlanta	Atlanta Tallow, Inc.
Augusta	Augusta	Shapiro Packing
Brunswick	--	L & L Crab Factory
Canton	--	Goldkist Poultry Growers
Carrollton	--	W. Georgia By-Products
Claxton	--	Claxton Poultry & Rend.
Columbus	Columbus	Southern Foods
Conley	Atlanta	Atlanta Processing
Cornelia	--	Ralston-Purina
Cumming	--	N. Georgia Rendering
Fitzgerald	--	Lowell Packing
Griffin	--	Tallowmasters of Georgia
Macon	Macon	G. Berno
Moultrie	--	Cope Rendering, Inc.
Moultrie	--	Moultrie Meat
Moultrie	--	Swift & Co.
Newnan	--	Beavers Packing
Pendergrass	--	J. D. Jewell, Inc.
Quitman	--	Brooks County Pkg.
Rome	--	Capko of Georgia
Savannah	Savannah	Meddin Packing
Savannah	Savannah	Shores Packing
Statesboro	--	Robbins Packing
Talmo	--	McEver Packing
Thomasville	--	Sunnyland Packing

State City	SMSA	Company
GEORGIA (cont.)		
Waycross	--	Cauley Packing
HAWAII		
Ewa Beach	Honolulu	Island Commodities Corp.
Honolulu	Honolulu	Ultramar Chemical
IDAHO		
Buhl	--	Carter Packing
Caldwell	--	Feather Plant
Caldwell	--	Idaho Meat Packers
Idaho Falls	--	Idaho Falls Animal Products
Nampa	--	Armour & Co.
Nampa	--	Idaho Animals Products
Payette	--	Mosier Rendering
Roberts	--	Golden Valley Packing
Twin Falls	--	Idaho Hide & Tallow
ILLINOIS		
Beardstown	--	Oscar Mayer, Inc.
Belleville	St. Louis	Kostelac Bros. Render
Belleville	St. Louis	M & L Rendering Service
Belleville	St. Louis	Millstadt Rendering
Benton	--	Petroff Packing
Cambridge	Davenport-Rock Island-Moline	Schnowske By-Products
Carbon Cliff	Davenport-Rock Island-Moline	Allaert Acres
Chicago	Chicago	Darling & Co.
Chicago	Chicago	General Rendering
Chicago	Chicago	H. Graver
Chicago	Chicago	H. Graver
Chicago	Chicago	Illinois Meat
Chicago	Chicago	Illinois Packing

State City	SMSA	Company
ILLINOIS (cont.)		
Chicago	Chicago	Nick Beucher & Sons
Chicago	Chicago	Reliable Packing, Inc.
Chicago	Chicago	Russell Packing, Inc.
Coal Valley	Davenport-Rock Island-Moline	Tri-City Rendering
Decatur	Decatur	Heinkel Packing
Decatur	Decatur	National By-Products
Duquoin	--	Duquoin Packing
E. St. Louis	St. Louis	Circle Meat Packing
E. St. Louis	St. Louis	Hunter Packing
E. St. Louis	St. Louis	Packer By-Products
E. St. Louis	St. Louis	Swift & Co.
Elgin	Chicago	Fox Valley Grease
Ellisville	--	Richard Hitchcock
Freeport	--	John T. LaForge
Galesburg	--	National By-Products
Joliet	Chicago	Kaluzny Bros.
Lynn Center	Davenport-Rock Island-Moline	Regal By-Products
Mason City	--	National By-Products
McCook	Chicago	By-Products, Inc.
Mendota	--	Mendota Rendering
National City	St. Louis	East St. Louis Rendering
National Stockyards	St. Louis	Royal Packing
Pekin	Peoria	Bird Provision
Peoria	Peoria	Shehan Packing
Rushville	--	Bartlow Bros. Packing

State City	SMSA	Company
ILLINOIS (cont.)		
Sandwich	--	Elmer Eva & Co.
Streator	--	National By-Products
Virginia	--	Virginia Packing
Wheeling	Chicago	Wheeling Rendering
INDIANA		
Anderson	Anderson	Emge Packing
Angola	--	Angola Reduction
Auburn	--	Auburn Tankage
Bloomington	--	Bloomington Packing
Chandler	Evansville	Wright Packing
Columbus	--	Columbus Reduction
Columbus	--	Stadler Packing
Ft. Branch	--	Emge Packing
Ft. Wayne	Fort Wayne	Stadler Fertilizer
Frankfort	--	Frankfort Rendering
Greensburg	--	Standard Fertilizer
Indianapolis	Indianapolis	National By-Products
Indianapolis	Indianapolis	Stark & Wetzel
Kendallville	--	Kendallville Fertilizer
Kentland	--	Evers Reduction
Madison	--	Pearl Packing
Muncie	Muncie	Marhoefer Packing
Madison	--	Madison Fertilizer
NewBerry	--	Farmers Tankage, Inc.
New Carlisle	South Bend	Animal By-Products Corp.

State City	SMSA	Company
INDIANA (cont.)		
New Castle	--	Rose Packing
New Salisbury	--	Wenning Packing
North Manchester	--	Grandstaff Rendering
Plymouth	South Bend	Plymouth Fertilizer
Shelbyville	Indianapolis	Bausback Fertilizer, Inc.
South Bend	South Bend	Gentner Packing
IOWA		
Alpha	--	Darling Rendering Plant
Alton	--	Alton Rendering Works
Boyden	--	Smit & Son Inc.
Carroll	--	Carroll Rendering Works
Cedar Rapids	Cedar Rapids	Wilson & Co.
Cherokee	--	Wilson & Co.
Clinton	--	National By-Products
Columbus Junction	--	Rath Packing
Davenport	Davenport	Oscar Mayer
Denison	--	Farmbest Packing
Denison	--	Iowa Beef Prod., Inc.
Des Moines	Des Moines	Bookey Packing
Des Moines	Des Moines	I D Packing
Des Moines	Des Moines	National By-Products
Dubuque	Dubuque	Dubuque By-Products
Dubuque	Dubuque	Dubuque Packing
Emmetsburg	--	Emmetsburg Rendering Works
Estherville	--	John Morrell

State City	SMSA	Company
IOWA (cont.)		
Ft. Dodge	--	Hormel
Ft. Dodge	--	Iowa Beef Products, Inc.
Ft. Dodge	--	Webster Processing
Greene	--	Greene Rendering
Harlan	--	Western Iowa Pork
Iowa City	--	National By-Products
Iowa Falls	--	Farmbest, Inc.
LeMars	--	LeMars Rendering Works
Marshall Town	--	Central Iowa Rendering
Marshall Town	--	Marshall Packing
Marshall Town	--	Swift & Co.
Martensdale	--	Carlson Rendering
Mason City	--	Armour & Co.
Mason City	--	Blue Ribbon Beef Packing
Muscatine	--	Richard & Sons
Oakland	Omaha	American Beef Packing
Osage	--	Kark Rendering
Ottumwa	--	John Morrell
Perry	--	Oscar Mayer
Pocahontas	--	Pocahontas Rendering
Postville	--	Hygrade Food Products
Quimby	--	Simonsen Mill-Rendering
Sac City	--	Sac City Rendering Works
Sioux City	Sioux City	Tri-State Tallow
Sioux City	Sioux City	Sioux By-Products

State City	SMSA	Company
IOWA (cont.)		
Sioux City	Sioux City	Sioux City Dressed Pork
Sioux City	Sioux City	Swift & Co.
Spencer	--	Spender Packing
Spencer	--	Spencer Rendering
Spirit Lake	--	Stoller Fisheries
Storm Lake	--	Hygrade Food Products
Wall Lake	--	Wall Lake Processing
Waterloo	Waterloo	Rath Packing
KANSAS		
Arkansas City	--	Arkansas City Rendering
Belleville	--	T. C. Flanagan
Coffeyville	--	Coffeyville Packing Inc.
Dodge City	--	Jayhawk Rendering
Ellis	--	Ellis Rendering
Kansas City	Kansas City	Standard Rendering
Kansas City	Kansas City	Kaw Valley Rendering
Osborne	--	Cady Dog Food
Wichita	Wichita	Excel Packing, Inc.
Wichita	Wichita	National By-Products
KENTUCKY		
Bowling Green	--	Bob White Packing
Butler	--	Griffin Industries
Clinton	--	Independent Rendering
Covington	Cincinnati	C. Rice Packing
Danville	--	Griffin Packing

State City	SMSA	Company
KENTUCKY (cont.)		
Henderson	Evansville	Farmers Tankage
Lexington	Lexington	Armour & Co.
Lexington	Lexington	Elm Hill Meats
Louisville	Louisville	Fischers Packing
Louisville	Louisville	Klarer Packing
Owensboro	--	Field Packing
Paducah	--	Metzger Bros. Packing
Russellville	--	Animal By-Products
LOUISIANA		
Abbeville	--	Seacoast Products
Alexandria	--	Louisiana Poultry By-Products
Alexandria	--	Rapides Packing
Angola	--	Angola Rendering
Baton Rouge	Baton Rouge	Sars of Louisiana
Cameron	--	Gulf Menhaden
Cameron	--	Louisiana Menhaden
Cameron	--	Ocean Protein
Chauvin	--	Aron & Vanis Blanchard
Chauvin	--	Chester Lapeyrouse
Chauvin	--	George Sevin
Chauvin	--	Julius Neil
Chauvin	--	Lapeyrouse Brothers
Chauvin	--	Lester Dubois
Chauvin	--	M. P. Marie

State City	SMSA	Company
LOUISIANA (cont.)		
Chauvin	--	Noland Blanchard
Chauvin	--	Rhodes Seafood
Chauvin	--	Thaddeus Pellgrin
Cocodrie	--	Gulf Seafood
Dulac	--	Quinn Menhaden Fisheries
Dulac	--	Robert Liner
Empire	--	Empire Menhaden
Empire	--	Quinn Menhaden Fisheries
Golden Meadow	--	Quality Seafood
Gonzales	--	Stevens Meat
Grand Isle	New Orleans	Grand Isle Seafood
Grand Isle	New Orleans	Guidry Seafood
Hammond	--	Veri-Fresh Poultry, Inc.
Harvey	New Orleans	Southern Shellfish
Houma	--	A. J. Authement, Jr.
Houma	--	Alvin Nelton
Houma	--	James Herbert
Houma	--	Norris Price
Houma	--	Ocean Protein, Inc.
Lafayette	Lafayette	L. A. Frey & Sons
Livingston	--	Modern Rendering
Monroe	Monroe	West Monroe Rendering
Montegut	--	Leke Chin Seafood
Montegut	--	Madison Fisheries
Morgan City	--	Smith Fish Meal
Shreveport	Shreveport	Reigel By-Products

State City	SMSA	Company
LOUISIANA (cont.)		
Shreveport	Shreveport	Shreveport Packing
Theriot	--	Marmande & Voisin
Violet	New Orleans	Gulf Soap Corp.
Westwego	New Orleans	Robinson Canning
MAINE		
Augusta	--	Lipman Poultry
Belfast	--	Penobscot Poultry
Eastport	--	Maine Marine Products
Eastport	--	Mearl Corp.
Rockland	--	Maine Sea Products
Rockland	--	Seapro, Inc.
Rumford	--	Twin Town Rendering
S. Portland	Portland	Pine State By-Products
MARYLAND		
Baltimore	Baltimore	Braun Rendering
Baltimore	Baltimore	Kavanaugh Products
Baltimore	Baltimore	Riverside Abattoir, Inc.
Baltimore	Baltimore	Schluderburg-Kurdel
Berlin	--	Ralston Purina
Bishop	--	Bishop Processing
Cambridge	--	Crisfield Dehydrating
Cambridge	--	Crisfield Dehydrating
Cambridge	--	J. M. Clayton
Cambridge	--	Eastern Shore Rendering
Elkridge	Baltimore	Braun Rendering

State City	SMSA	Company
MARYLAND (cont.)		
Hydes	Baltimore	E. H. Tolzman & Sons, Inc.
Salisbury	--	Mardel By-Products
Westminister	Baltimore	Leidy Rendering
MASSACHUSETTS		
Gloucester	--	Lipman Marine Products
New Bedford	New Bedford	New Bedford Fish Product
Roxbury	Boston	Jas. F. Morse & Co.
Somerville	Boston	Jas. F. Morse
Somerville	Boston	North East Packing
Springfield	Springfield-Chicopee-Holyoke	Springfield Rendering
Tewksbury	Lowell	Lowell Rendering
Woburn	Boston	Independent Tallow
MICHIGAN		
Adrian	--	Adrian Tankage
Battle Creek	--	Battle Creek Rendering
Coldwater	--	Coldwater Rendering
Custer	--	Joseph Sanders, Inc.
Detroit	Detroit	Admiral Food Corp.
Detroit	Detroit	Detroit Rendering
Detroit	Detroit	Wayne Soap
Holland	Grand Rapids	Holland Rendering Works
Kalamazoo	Kalamazoo	Kalamazoo Rendering
Melvindale	Detroit	Darling & Co.
Plainwell	--	Murray Packing
Sturgis	--	Wall Packing

State City	SMSA	Company
MICHIGAN (cont.)		
Traverse City	--	Northern Reduction
MINNESOTA		
Albert Lea	--	Wilson By-Products
Austin	--	George A. Hormel
Blue Earth	--	Blue Earth Rendering
Duluth	Duluth-Superior	Elliott Packing
Edgerton	--	Edgerton Rendering
Fergus Falls	--	Fergus Falls Rendering
Fergus Falls	--	National Tea
Long Prairie	--	Long Prairie Rendering
Luverne	--	Mid Processing
Marshall	--	Marshall Processing
New Brighton	Minneapolis-St. Paul	Mengelkock
New Brighton	Minneapolis-St. Paul	Minnesota Hide & Tallow
Red Lake Falls	--	Red Lake Falls Rendering
Redwood Falls	--	Redwood Falls Rendering
St. Cloud	--	St. Cloud Rendering
St. Cloud	--	Stovall By-Products
St. Paul	Minneapolis-St. Paul	G. Bartusch
St. Paul	Minneapolis-St. Paul	John Morrell
S. St. Paul	Minneapolis-St. Paul	Armour & Co.
S. St. Paul	Minneapolis-St. Paul	Swift & Co.
S. St. Paul	Minneapolis-St. Paul	Van Hoven, Inc.
Trimont	--	Monterey Rendering
Waseca	--	Waseca Rendering

State City	SMSA	Company
MINNESOTA (cont.)		
Windom	--	Caldwell Packing
Worthington	--	Armour & Co.
Worthington	--	Worthington Rendering
MISSISSIPPI		
Batesville	--	Robinson Brothers Packing
Clarksdale	--	Delta Packing
Collins	--	Collinswood Poultry
Forest	--	Central By-Products
Grenada	--	Pioneer Boneless Beef
Hattiesburg	--	Mississippi Poultry
Hazelhurst	--	Sanderson Farms
Hernando	--	Hernando Packing Inc.
Jackson	Jackson	Jackson Packing
Jackson	Jackson	Jackson Reduction
Jackson	Jackson	Swift & Co.
Laurel	--	Laurel By-Products
Laurel	--	Sanderson Farms
Laurel	--	Wayne Poultry
Meridian	--	Owen Brothers Packing
Moss Point	--	Haynie Products Inc.
Moss Point	--	Standard Products
Moss Point	--	The Fish Meal
Tupelo	--	Mid-South Packers, Inc.
Tupelo	--	Tupelo Processing
West Point	--	Bryan Brothers Packing

State City	SMSA	Company
MISSOURI		
Blackwater	--	National By-Products
California	--	Ralston-Purina
Cape Girardeau	--	Cape Rendering
Columbia	--	Rader Packing
Horton	--	Rich Hill Rendering
Jefferson City	--	Central Rendering
Joplin	--	Herrod Packing
Joplin	--	Joplin Rendering
Josephville	St. Louis	Armour & Co.
Lee's Summit	Kansas City	Oldham Sausage
Lee's Summit	Kansas City	Rice Sausage
Mexico	--	Baker Packing
Mexico	--	McGee Packing
Moberly	--	Moberly Packing
Noel	--	Ralston-Purina
Poplar Bluff	--	Poplar Bluff Packing
Quitman	--	Reliable Rendering
Rock Port	--	Missouri Beef Packers
St. Joseph	St. Joseph	Dugdale Packing
St. Joseph	St. Joseph	Seitz Packing
St. Joseph	St. Joseph	Terminal Warehouse
St. Louis	St. Louis	Binz Hide & Tallow
St. Louis	St. Louis	Independent Packing
St. Louis	St. Louis	Krey Packing
St. Louis	St. Louis	St. Louis Hide & Tallow

State City	SMSA	Company
MISSOURI (cont.)		
St. Louis	St. Louis	Stovall By-Products
St. Louis	St. Louis	Ziegenbalg
Sedalia	--	National By-Products
South St. Joseph	St. Joseph	Swift & Co.
Springfield	Springfield	Leduc Packing
Springfield	Springfield	MFA Rendering
Springfield	Springfield	Southwest Rendering
Tarkio	--	J & J Rendering Works
MONTANA		
Billings	Billings	Billings Rendering
Billings	Billings	Midland Empire Packing
Billings	Billings	Pierce Packing
Bozeman	--	Vollmer & Sons Inc.
Butte	--	New Butte Butcher
Dillon	--	Dillon Rendering
Glasgow	--	Austin's Rendering
Great Falls	Great Falls	Great Falls Meat
Great Falls	Great Falls	Montana Rendering
Havre	--	Havre Rendering
Miles City	--	Miles City Rendering
Missoula	--	Western Montana By-Products
Sidney	--	Sidney Rendering

State City	SMSA	Company
NEBRASKA		
Cozad	--	Platte Valley Packing
Crete	--	Swingle & Co.
Dakota City	Sioux City	Iowa Beef Packers
Fremont	--	George Hormel & Co.
Grand Island	--	Andy's Rendering Plant, Mid-West By-Products
Grand Island	--	Swift & Co.
Hartington	--	Hartington Rendering
Lexington	--	Cornland Dressed Beef, Inc.
Lexington	--	Lexington Rendering
Lincoln	Lincoln	Acme Markets (American Stores)
McCook	--	Nebraska Rendering Corp.
Minden	--	Minden Beef
Norfolk	--	Midwestern Beef, Inc.
Norfolk	--	Norfolk Rendering Works
North Platte	--	Central Nebraska Packing
Omaha	Omaha	Armour and Co.
Omaha	Omaha	Cornhusker Packing
Omaha	Omaha	Eustice Processing
Omaha	Omaha	Greater Omaha Packing, Inc.
Omaha	Omaha	John Roth & Son
Omaha	Omaha	National By-Products
Omaha	Omaha	Sioux Beef
Omaha	Omaha	Swift & Co.
Omaha	Omaha	Union Packing
Omaha	Omaha	Wilson & Co.
Omaha	Omaha	X-ite Laboratory

State City	SMSA	Company
NEBRASKA (cont.)		
Pender	--	Independent Rendering
Rushville	--	Rushville Rendering
Schuyler	--	Schuyler Packing
Scottsbluff	--	Scottsbluff Rendering
Scottsbluff	--	Swift & Co.
Tecumseh	--	Tecumseh Rendering Plant
Wahoo	--	Breunig Rendering Works, Inc.
Wayne	--	Wayne Rendering
West Point	--	Iowa Beef Packers
West Point	--	West Point Rendering
York	--	York Packing, Inc.
NEVADA		
Henderson	Las Vegas	Nevada Star
Reno	Reno	Reno Rendering Works
Yerington	--	Peoples Packing
NEW HAMPSHIRE		
Manchester	Manchester	Granite State Packing
NEW JERSEY		
Bayonne	Jersey City	Metropolitan Rendering
Elizabeth	Newark	Allen Packing
Elizabeth	Newark	I. Schonwalter Inc.
Harrison	Jersey City	Theobald Industries
Jersey City	Jersey City	Paterson Tallow
Kearny	Jersey City	Harrison By-Products

State City	SMSA	Company
NEW JERSEY (cont.)		
Newark	Newark	Interstate Soap
Newark	Newark	Lincoln Farm Products Corp.
Newark	Newark	Linden Packing
Newark	Newark	Standard Tallow
North Bergen	Jersey City	Charles Miller & Co.
Ft. Monmouth	--	J. Howard Smith, Inc.
Secaucus	Jersey City	N. J. Soap
Secaucus	Jersey City	N. J. Tallow
Secaucus	Jersey City	United Butchers Render
Tuckertown	--	Fish Products
Whippany	Newark	Whippany Soap
Wildwood	--	N. J. Menhaden Products
NEW MEXICO		
Albuquerque	Albuquerque	Albuquerque Rendering Works
Albuquerque	Albuquerque	Atlas Rendering
Clovis	--	Atlas Rendering
Clovis	--	Starkey Packing
Clovis	--	Swift & Co.
Roswell	--	Glover Packing
NEW YORK		
Albany	Albany-Schenectady-Troy	Carr Packing
Albany	Albany-Schenectady-Troy	Tobin Packing
Amagansett	New York	Atlantic Processing

State City	SMSA	Company
NEW YORK (cont.)		
Brier Hill	--	Perretta Packing
Buffalo	Buffalo	Biel Rendering
Buffalo	Buffalo	Buffalo Meat Packing
Buffalo	Buffalo	Darling & Co.
Buffalo	Buffalo	Eugene C. Kraus & Ball
Center Moriches	New York	Toft Rendering
E. Syracuse	Syracuse	Syracuse Render Inc.
Frewsburg	--	Jamestown Rendering
Gowanda	Buffalo	Eastern Tanners
Ossining	New York	General Mills, Inc.
Rochester	Rochester	Tobin Packing
Rochester	Rochester	William Stappenbach, Inc.
Syracuse	Syracuse	Ralph Packing
NORTH CAROLINA		
Asheboro	--	Piedmont By-Products, Inc.
Asheville	Asheville	Asheville By-Products
Atlantic	--	Smith Brothers Fish
Bayboro	--	Bayboro Dehydrating
Beaufort	--	Beaufort Fisheries
Beaufort	--	Seashore Packing
Beaufort	--	Standard Products of N. C.
Belhaven	--	Belhaven Dehydrating
Clinton	--	Lundy Packing
Colerain	--	Perry-Wynn
Fayetteville	Fayetteville	Cape Fear Feed Products

State City	SMSA	Company
NORTH CAROLINA (cont.)		
Gastonia	--	Carolina & Southern Proc.
Greensboro	Greensboro-Winston-Salem-High Point	Carolina By-Products
Hickory	--	Hickory Packing
Iron Station	--	Hudson Poultry
Kinston	--	Frosty Morn Packing
Mocksville	--	Veterans Grease & Tallow
Morehead City	--	Carolina Menhaden Products
Morehead City	--	Standard Products
Morgantown	--	Breeden Poultry
New Bern	--	Azalea Meat
New Bern	--	Craven Rendering
Oakboro	--	Enterprise Rendering
Salisbury	--	White Packing
Shelby	--	Shelby Processing
Southport	Wilmington	Standard Products of N. C.
Wilson	--	Swift & Co.
NORTH DAKOTA		
Glen Ullin	--	Sioux Rendering
Minot	--	Northwest Rendering
Minot	--	Tasterite
West Fargo	Fargo-Moorhead	Dakota Rendering
Williston	--	Williston Packing

State City	SMSA	Company
OHIO		
Akron	Akron	Akron Soap
Archbold	--	Eckert Packing
Berlin	--	Holmes By-Product
Bryan	--	Becker Barnes & Becker
Canton	Canton	Sugardale Provision
Cincinnati	Cincinnati	H. H. Meyer Packing
Cincinnati	Cincinnati	Kentucky Chemical Ind.
Cincinnati	Cincinnati	Robert Runtz, Inc.
Cincinnati	Cincinnati	The E. Kahn's Son
Cleveland	Cleveland	Cuyahoga Soap
Cleveland	Cleveland	Darling & Co.
Cleveland	Cleveland	Earl C. Gibbs, Inc.
Cleveland	Cleveland	A. W. Stadler
Columbus	Columbus	David Davies
Columbus	Columbus	Inland Products, Inc.
Dayton	Dayton	The Sucher Packing
Defiance	--	Defiance Fertilizer
Eaton	Dayton	Eaton Fertilizer
Gallipolis	--	Gallipolis Reduction
Grand Rapids	Toledo	Weston Fertilizer
Marietta	--	Dickson Rendering
Massillon	Canton	Superior's Brand Meats
Pique	Dayton	Val Decker Packing
Reading	Cincinnati	Darling & Co.
Troy	Dayton	Eckert Packing
Wapakoneta	--	C. A. Wintzer & Son
Wauseon	--	Wauseon Fertilizer

State City	SMSA	Company
OKLAHOMA		
Ada	--	Ada By-Products
Collinsville	Tulsa	Tulsa Rendering
Duncan	--	Six-Way, Inc.
Durant	--	Potter Rendering
Guymon	--	Guymon Rendering
Guymon	--	Swift & Co.
Lawton	Lawton	Lawton Rendering Plant
McAlester	--	McAlester By-Products
Muskogee	--	United Rendering
Oklahoma City	Oklahoma City	Butcher Packing
Oklahoma City	Oklahoma City	Continental Products
Oklahoma City	Oklahoma City	Hacks Rendering
Oklahoma City	Oklahoma City	Oklahoma Rendering
Oklahoma City	Oklahoma City	Wilson & Co., Inc.
Tulsa	Tulsa	Brooks Packing
Tulsa	Tulsa	Tulsa Tallow & Feed
OREGON		
Baker	--	Clarke Rendering
Banks	Portland	Ontario Rendering
Eagle Point	--	Southern Oregon Tallow
Harrisburg	--	Eugene Chemical Works
Hillsboro	Portland	Crown Rendering Inc.
Klamath Falls	--	Klamath Tallow
Portland	Portland	Associated Meat Packers, Inc.
Portland	Portland	Brander Meat

State City	SMSA	Company
OREGON (cont.)		
Portland	Portland	Northwest Organic Products
Portland	Portland	Pacific Meat
Portland	Portland	Portland Rendering Div.
Portland	Portland	Western States Rendering
Redmond	--	Redmond Rendering
Warrenton	--	Bio-Products
PENNSYLVANIA		
Allentown	Allentown-Bethlehem-Easton	Arbogast & Bastian, Inc.
Allentown	Allentown-Bethlehem-Easton	Robert A. Reichard, Inc.
Allenwood	--	Watson's Rendering Plant
Bainbridge	Lancaster	Ebersole Brothers
Bird-In-Hand	Lancaster	Bird-In-Hand Poultry
Boyertown	Reading	John H. Robinson, Jr.
Bradford	--	Thessn Brothers
Bristol	Philadelphia	Paul Harrigan & Sons
Burgettstown	Pittsburgh	Burgettstown Rendering
Chester	Philadelphia	American Rendering
Coraopolis	Pittsburgh	American Tallow Corp.
Dover	York	Christ Lamparter's Sons
East Earl	Lancaster	Messner Brothers
Elizabethville	Harrisburg	North Penn Hide
Elroy	Philadelphia	North Penn Hide
Erie	Erie	Erie Reduction
Falmouth	Lancaster	A. F. Brandt's & Sons
Fredericksburg	--	College Hill Poultry

State City	SMSA	Company
PENNSYLVANIA (cont.)		
Fredericksburg	--	G. & H. Fortyniners, Inc.
Greencastle	--	A. F. Rees, Inc.
Hatfield	--	Hatfield Packing
Lancaster	Lancaster	Fry's Rendering Works
Lancaster	Lancaster	Ezra W. Martin
Lancaster	Lancaster	C. H. Thomas Sons, Inc.
Lansdale	Philadelphia	Baum's Meat Packing
Lewistown	--	Vogt's Rendering Works
Lock Haven	--	Winner Packing
Matamoras	--	J. O. Ryder Rendering
Middleburg	--	Middleburg Rendering
Mifflintown	--	E. C. Cleck
Myerstown	--	Myerstown Hide & Tallow
Nescopeck	Wilkes-Barre-Hazleton	Corenco Corp.
New Stanton	Pittsburgh	Miller Rendering Plant
Philadelphia	Philadelphia	Louis Burk
Philadelphia	Philadelphia	Butler Rendering
Philadelphia	Philadelphia	Consolidated Dress Beef
Philadelphia	Philadelphia	Cross Brothers
Philadelphia	Philadelphia	Independent Mfg.
Philadelphia	Philadelphia	Keystone Rendering
Philadelphia	Philadelphia	Mutual-Shoemaker
Pineville	Philadelphia	Howard Walker & Son, Inc.
Pittsburgh	Pittsburgh	Hays Rendering

State City	SMSA	Company
PENNSYLVANIA (cont.)		
Pittsburgh	Pittsburgh	Inland Products, Inc.
Pittsburgh	Pittsburgh	Penn Tallow
Pittston	Wilkes-Barre-Hazelton	Pennsylvania Hide & Rendering
Reading	Reading	Reading Bone Fertilizer
Seven Valleys	York	John W. Kerchner, Inc.
Shamokin	--	Shamokin Packing
Slovan	Pittsburgh	Delfrate Packing
Slovan	Pittsburgh	Dominec Bongiorni
PUERTO RICO		
Ponce	--	National Pkg.
Mayaguez	--	Star Kist Caribe, Inc.
Mayaguez	--	Del Monte De P.R.
Mayaguez	--	Del Monte De P.R.
RHODE ISLAND		
Johnston	Providence-Pawtucket-Warwick	Johnston Rendering
Pawtucket	Providence-Pawtucket-Warwick	Colfax Packing
Pawtucket	Providence-Pawtucket-Warwick	Pawtucket Rendering
Pt. Judith	--	Pt. Judith Fishermen's
Woonsocket	Providence-Pawtucket-Warwick	J. P. O'Donnell
SOUTH CAROLINA		
Columbia	Columbia	Roddy Packing Inc.
Ft. Mill	--	Ft. Mill Products, Inc.
Gaffney	--	United Beef
Greenwood	--	Greenwood Packing Plant

State City	SMSA	Company
SOUTH CAROLINA (cont.)		
Orangeburg	--	Azalea Meats, Inc.
Orangeburg	--	Hygrade Food Products Corp.
Walterboro	--	Old Fort Packing
SOUTH DAKOTA		
Watertown	--	Watertown Rendering
Sioux Falls	Sioux Falls	Sioux Falls Rendering
De Smet	--	De Smet Rendering
Sioux Falls	Sioux Falls	John Morrell & Co.
Sioux Falls	Sioux Falls	Greenlee Packing, Inc.
Huron	--	Armour & Co.
Madison	--	John Morrell & Co.
Mitchell	--	George A. Hormel & Co.
Rapid City	--	Black Hills Packing
TENNESSEE		
Chattanooga	Chattanooga	Chattanooga Rendering
Chattanooga	Chattanooga	Southern Provision
Clarksville	--	Frosty Morn Packing
Columbia	--	Parks-Harris
Columbia	--	Tennessee Valley Packing
Concord	Knoxville	Herron Packing
Knoxville	Knoxville	East Tennessee Packing
Knoxville	Knoxville	Knoxville By-Products
Knoxville	Knoxville	Lay Packing
Lenoir City	--	Elm Hill Meats, Inc.

State City	SMSA	Company
TENNESSEE (cont.)		
Memphis	Memphis	Armour Packing
Memphis	Memphis	Fineburg Brothers
Memphis	Memphis	Memphis Butchers
Memphis	Memphis	Morrell Packing
Memphis	Memphis	Valley Products
Nashville	Nashville	Jacobs Packing
Nashville	Nashville	McRedmond Rendering
Nashville	Nashville	Nashville Rendering
Nashville	Nashville	Neuhoff Packing
Nashville	Nashville	Rudy Sausage
Pulaski	--	Mid-Tennessee Rendering
Powell	Knoxville	Purity Packing
Shelbyville	--	Southern Rendering
Sweetwater	--	Loomis Packing
Union City	--	Duncan Tankage
TEXAS		
Abilene	Abilene	Gooch Packing
Amarillo	Amarillo	Amarillo Packing
Amarillo	Amarillo	Amarillo Rendering
Amarillo	Amarillo	Glover Packing
Amarillo	Amarillo	Pinkney Packing
Austin	Austin	Austin Community Livest
Ballinger	--	Dankworth Packing
Bastrop	--	Texas Rendering
Beaumont	Beaumont-Port Arthur-Orange	Zummo Meat

State City	SMSA	Company
TEXAS (cont.)		
Clarkwood	Corpus Christi	Doehne Provision
Dalhart	--	Dalhart Rendering
Dallas	Dallas	Columbia Packing
Dallas	Dallas	Hapco Rendering
Dallas	Dallas	Texas Meat Packers
Dallas	Dallas	Valcar Enterprises
El Paso	El Paso	Casuco Corp.
El Paso	El Paso	Peyton Packing
Ft. Worth	Ft. Worth	Hygrade Foods, Inc.
Ft. Worth	Ft. Worth	Minton Rendering
Ft. Worth	Ft. Worth	Swift & Co.
Ft. Worth	Ft. Worth	Tarrant Rendering
Hamilton	Ft. Worth	Hamilton Rendering
Houston	Houston	Friedman Packing
Houston	Houston	Pauley Blue Ribbon
Houston	Houston	Pepper Rendering
Houston	Houston	Standard Rendering
Joaquin	--	Texas Poultry Products
Los Fresnos	Brownsville-Harlingen-San Benito	South Texas By-Products
Lubbock	Lubbock	Farm Pac Kitchens
Midland	Midland	CJM Packing
Nacogdoches	--	Ralston Purina
Nixon	--	Nixon By-Products
Palestine	--	Vernon Calhoun Packing
Pampa	--	Panhandle Packing
Sabine Pass	Beaumont-Port Arthur-Orange	Texas Menhaden

State City	SMSA	Company
TEXAS (cont.)		
San Angelo	San Angelo	San Angelo By-Products
San Antonio	San Antonio	ABC Rendering
San Antonio	San Antonio	Apache Packing
San Antonio	San Antonio	Auge Packing
San Antonio	San Antonio	Cudahy Packing
San Antonio	San Antonio	Melton Provision
San Antonio	San Antonio	Roegelein Provision
San Antonio	San Antonio	Steurnagel Packing
San Antonio	San Antonio	Swift & Co.
Sweetwater	--	Ridley Packing
Temple	--	Seastrunk Rendering
Texarkana	Texarkana	D & W Packing
Vernon	--	Wright Packing
Waco	Waco	Youngbloods
Whitewright	--	Whitewright By-Products
Wichita Falls	Wichita Falls	West Texas Rendering
Wichita Falls	Wichita Falls	Wichita Rendering
UTAH		
Cedar City	--	Nelson Packing
Hyrum	--	Valley Rendering
Moroni	--	Moroni Turkey Processing
Ogden	Ogden	Utah By-Products
Price	--	Carbon-Emery Animal
Provo	Provo-Orem	John Kuhni & Sons
Salina	--	Turkey Growers, Inc.

State City	SMSA	Company
UTAH (cont.)		
Salt Lake City	Salt Lake City	United By-Products
Spanish Fork	Provo-Orem	Utah Animal By-Products
VIRGINIA		
Alexandria	Washington, D. C.	Norton & Co.
Bristol	--	Valleydale Packers, Inc.
Broadway	--	Rockingham Poultry Market
Cape Charles	--	Haynie Products
Chesapeake	--	Norfolk Tallow
Elliston	--	Green Hill, Inc.
Fairport	--	Menhaden
Fairport	--	Standard Products
Hampton	Newport News-Hampton	Hunt Crab Meal
Harrisonburg	--	Triangle E By-Products
Kilmarnock	--	Standard Products
Lottsburg	--	Keyser Brothers
Lynchburg	Lynchburg	Kavanaugh Industries
Morattico	--	C. V. Processing Corp.
Newport News	Newport News-Hampton	Tidewater Crab
Perrin	--	York River Seafoods
Reedville	--	Haynie Products
Richmond	Richmond	Hygrade Food Products, Inc.
Salem	Roanoke	Valleydale Packers, Inc.
Smithfield	--	Gwaltney, Inc.
Timberville	--	Shen-Valley Meat Packers
Winchester	--	Winchester Rendering

State City	SMSA	Company
WASHINGTON		
Aberdeen	--	Pacific Protein, Inc.
Anacortes	--	J. E. Trafton & Son
Auburn	Seattle-Everett	Auburn Packing
Bellingham	--	A & M By-Products
Bellingham	--	A & M By-Products
Blaine	--	Blaine Fish Products
Clarkston	--	Bristol Packing
Ellensburg	--	Schaake Packing Inc.
Elma	--	Grays Harbor Rendering
Everett	Seattle-Everett	Puget Sound By-Products
Everett	Seattle-Everett	Puget Sound By-Products
Longview	--	Longview Meat
Lynden	--	DeJong Packing
Mt. Vernon	--	T & H Render Works, Inc.
Puyallup	Tacoma	Johnson Tallow Works
Reedsville	--	Sterling Services
Seattle	Seattle-Everett	Pacific Rendering, Inc.
Seattle	Seattle-Everett	Pacific Reefer Fisheries
Seattle	Seattle-Everett	Seattle Packing
Seattle	Seattle-Everett	Seattle Rendering Works
Seattle	Seattle-Everett	Seattle Rendering Works
Spokane	Spokane	Hygrade Food Products Corp.
Spokane	Spokane	Spokane Rendering
Summer	Tacoma	Weber & Co.
Tacoma	Tacoma	Hygrade Food Products Corp.

State City	SMSA	Company
WASHINGTON (cont.)		
Tacoma	Tacoma	Puget Sound Render Works
Toppenish	--	Western Packing
Wenatchee	--	Wenatchee Rendering
Yakima	--	Swift & Co.
WISCONSIN		
Antigo	--	Antigo Rendering Works
Appleton	--	Wisconsin Rendering
Barron	--	Indianhead Rendering
Berlin	--	Wisconsin By-Products
Chippewa Falls	--	Peters Packing
Cudahy	Milwaukee	Cudahy Packing
Eau Claire	--	Eau Claire Rendering
Eleva	--	Netex Mink Foods, Inc.
Ft. Atkinson	--	Jones Dairy Farm
Green Bay	Green Bay	Armour & Co.
Green Bay	Green Bay	Green Bay Soap
Green Bay	Green Bay	Liebman Packing
Green Bay	Green Bay	Packerland Packing, Inc.
Jefferson	--	Stoppenbach Sausage
Kenosha	Kenosha	Kenosha Packing
Madison	Madison	Oscar Mayer
Mayville	--	Black Giant Feathermeal
Milwaukee	Milwaukee	Badger By-Products
Milwaukee	Milwaukee	Milwaukee Tallow & Grease
Muskego	Milwaukee	Muskego Rendering

State City	SMSA	Company
WISCONSIN (cont.)		
Oconto	--	Schilling Fish, Inc.
Onalaska	--	Lea Bros. Rendering
Stratford	--	Stratford Rendering
Waterloo	--	Waterloo Melting By-Products
Weyauwega	--	Wolf River Sausage
Whitehall	--	Lea Bros. Rendering
Whitehall	--	Whitehall Packing
WYOMING		
Casper	--	Rocky Mountain Packing
Sheridan	--	Sheridan Meat
Torrington	--	Scottie's By-Products
Worland	--	Worland By-Products

F.17 Soap and Detergents

Soaps consist mostly of sodium or potassium salts of fatty acids containing 12 to 18 carbon atoms. They can be prepared by reacting sodium or potassium hydroxide with fats or oils, or by neutralizing fatty acids with sodium or potassium hydroxide or sodium carbonate.

Synthetic detergents can be divided into five main chemical classes: sulfated fatty alcohols, alkyl-aryl sulfonates, miscellaneous sulfates and sulfonates, cationic agents, and nonionic agents. These may be manufactured by combining either a linear alkylate or fatty alcohol with sulfuric acid and then neutralizing with caustic. The active agents in detergents vary from 20 to 40 percent with the remainder including builders, brighteners, dyes, etc.

There were 1,069 soap and detergent plants in the United States at the end of 1968(47) (see table F-30). These plants range from single-person operations to one plant with 2,000 employees; the most common size appears to be between 5 and 15 employees. Total sales of soaps and detergents, according to the Soap and Detergent Association, amounted to 5.54 billion pounds in 1967 for 40 manufacturers which comprised about 85 percent of the industry.

A map showing the geographical distribution of soap and detergent plants in the United States is shown in figure F-27. From this figure, it can be seen that the most heavily populated areas have the highest concentration of soap and detergent plants. In the New York SMSA for instance, there are 99 plants; in the Los Angeles-Long Beach SMSA, there are 67 plants.

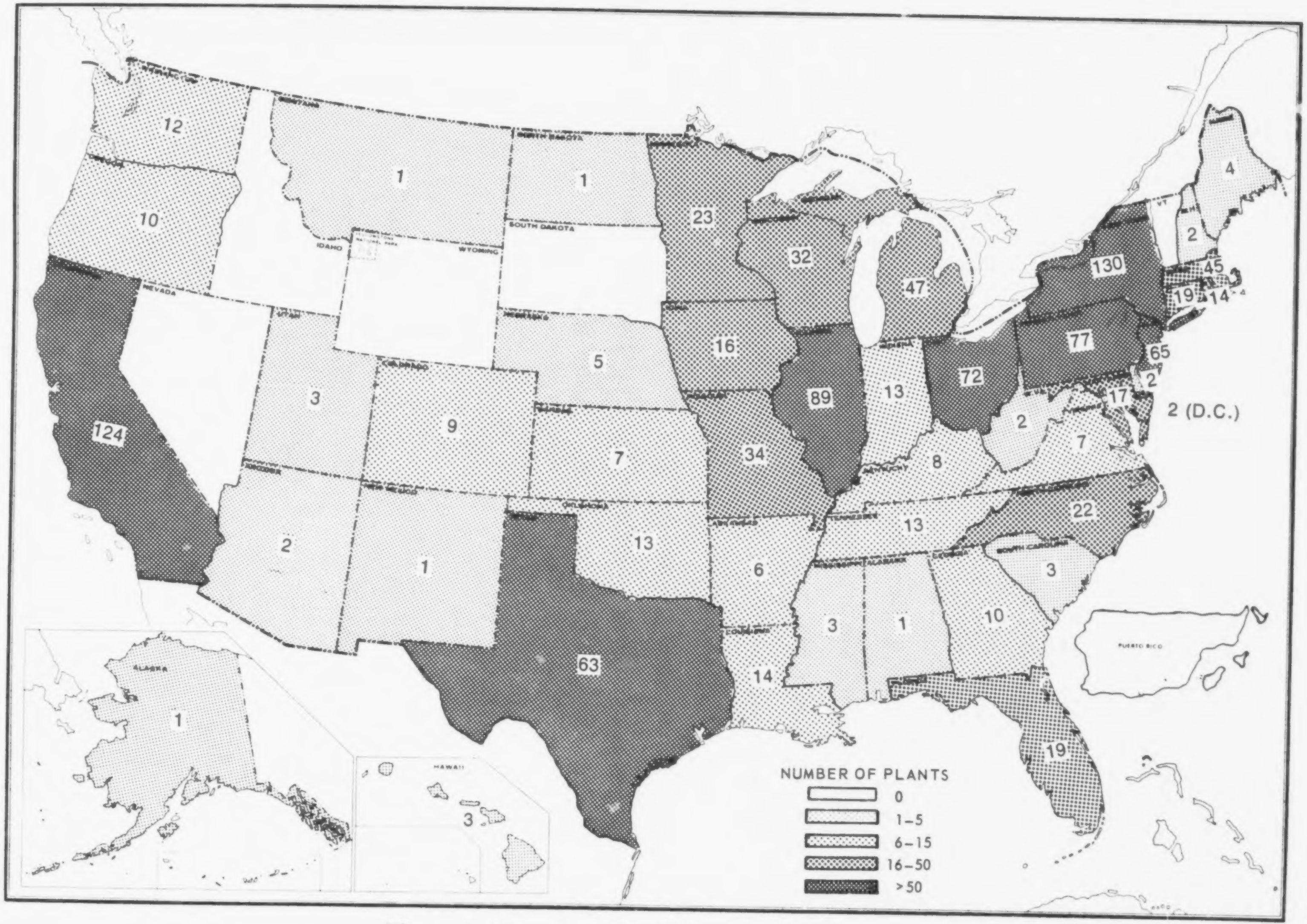
12
10
1
1
IDAHO
WYOMING
SOUTH DAKOTA
NEVADA
23
32
47
4
2
45
130
19
14
124
3
9
5
16
89
13
72
77
65
2
17
2 (D.C.)
7
2
8
34
7
22
13
13
2
1
6
3
3
1
10
14
63
19
1
ALASKA
HAWAII
3
PUERTO RICO
NUMBER OF PLANTS
0
1–5
6–15
16–50
>50

Figure F-27. Soap and detergent plants, 1969.

The major air pollution problem of soap manufacturing is odor, while of detergent manufacturing, it is particulate pollution as well as contaminants such as hydrocarbons, chlorine, hydrogen chloride, and sulfur oxides. (Dust emissions from soap manufacture are usually an in-plant problem.) Spray-drying of soaps, however, can result in particulate emissions similar to those emitted in detergent manufacture; thus, the source of these particulates in both soap and detergent plants is the spray tower. The emission is a dust-laden gas, containing up to 200 milligrams of particulate per cubic meter of gas. The entrained particles, which are small compared to the spray-dried product, are referred to as fines, but they are large (about 50 percent are larger than 40 microns) as far as cyclone collection efficiencies are concerned.

Cyclones, spray chambers, packed scrubbers, and venturi scrubbers are used to control the spray tower emissions. The odor level of the tower exhaust may run 4 or 5 odor units per cu ft and can be controlled by incineration or by scrubbing with an acid solution.

Table F-30. SOAP AND DETERGENT PLANTS
January 1969

State City	SMSA	Company
ALABAMA		
Birmingham	Birmingham	Star Soap
ALASKA		
Anchorage	--	Don Chemical Co., Inc.
ARIZONA		
Phoenix	Phoenix	Sun Ray Chemical
Tucson	Tucson	Walin Products
ARKANSAS		
El Dorado	--	Teco Corp.
Jonesboro	--	Jacks Chemical
Little Rock	Little Rock	Loetscher Industries
N. Little Rock	Little Rock	First National Chemical Corp.
Siloam Springs	--	Chemical Corp.
Texarkana	Texarkana	Physically Handicapped
CALIFORNIA		
Alhambra	Los Angeles-Long Beach	Cal-State Home Products
Anaheim	Anaheim-Santa Ana-Garden Grove	Galaxie Chemical
Bakersfield	Bakersfield	Hudson Chemicals Inc.
Bakersfield	Bakersfield	Tri-Col Products
Bell	Los Angeles-Long Beach	Smith, Robert Mfg.
Berkeley	San Francisco-Oakland	Colgate-Palmolive
Berkeley	San Francisco-Oakland	Far-Best Corp.

State City	SMSA	Company
CALIFORNIA (cont.)		
Berkeley	San Francisco-Oakland	Hensley Chemical
Berkeley	San Francisco-Oakland	Libby Laboratories
Berkeley	San Francisco-Oakland	Philadelphia Quartz Cal.
Berkeley	San Francisco-Oakland	Philadelphia Quartz Cal.
Buena Park	Anaheim-Santa Ana-Garden Grove	Galaxie Chemical
Castro Valley	San Francisco-Oakland	Continental Laboratories
City of Industry	Los Angeles-Long Beach	W.R. Grace Co., Inc.
Concord	San Francisco-Oakland	Pacific Chemical
Costa Mesa	Anaheim-Santa Ana-Garden Grove	Waljan Products, Inc.
Culver City	Los Angeles-Long Beach	Merit Mfg.
El Cajon	San Diego	Sabin, Harry J. & Cora B.
El Monte	Los Angeles-Long Beach	Sherman Stanley
Fresno	Fresno	Bruce Sales
Fresno	Fresno	Ol Rebel, Inc.
Fullerton	Anaheim-Santa Ana-Garden Grove	Thurmond Chemicals, Inc.
Gardena	Los Angeles-Long Beach	Electro Bleach Products
Gardena	Los Angeles-Long Beach	Luseaux Laboratories
Gardena	Los Angeles-Long Beach	Luseaux Laboratories
Gardena	Los Angeles-Long Beach	National Sanitary Supply
Hanford	--	Vasco Chemicals, Inc.
Healdsburg	--	Shoffeitts Products
Inglewood	Los Angeles-Long Beach	Shrader Chemical
Lakewood	Los Angeles-Long Beach	Purex Corp. Ltd.
La Mirada	Los Angeles-Long Beach	Chemifax
Long Beach	Los Angeles-Long Beach	Hemphill, E. J.
Long Beach	Los Angeles-Long Beach	Procter & Gamble Mfg.

State City	SMSA	Company
CALIFORNIA (cont.)		
Long Beach	Los Angeles-Long Beach	Search Mfg.
Long Beach	Los Angeles-Long Beach	Warren, Welton A.
Los Angeles	Los Angeles-Long Beach	American Coat Hanger Mfg.
Los Angeles	Los Angeles-Long Beach	Better Housekeeping Products
Los Angeles	Los Angeles-Long Beach	Bordens Enterprises
Los Angeles	Los Angeles-Long Beach	Cal-Tek Industries
Los Angeles	Los Angeles-Long Beach	Cal Pac Chemical, Inc.
Los Angeles	Los Angeles-Long Beach	California Soap, Inc.
Los Angeles	Los Angeles-Long Beach	Calusa Chemical, Inc.
Los Angeles	Los Angeles-Long Beach	Coast Detergent, Inc.
Los Angeles	Los Angeles-Long Beach	Coast Detergent, Inc.
Los Angeles	Los Angeles-Long Beach	Emergy Industries, Inc.
Los Angeles	Los Angeles-Long Beach	Far-Best Corp.
Los Angeles	Los Angeles-Long Beach	Gabels Cosmetics
Los Angeles	Los Angeles-Long Beach	J. C. Garet, Inc.
Los Angeles	Los Angeles-Long Beach	Grath Products
Los Angeles	Los Angeles-Long Beach	Hygin Sanitary Supply
Los Angeles	Los Angeles-Long Beach	Imperial Chemical
Los Angeles	Los Angeles-Long Beach	Ken Dry Corp.
Los Angeles	Los Angeles-Long Beach	Ken Dry Corp.
Los Angeles	Los Angeles-Long Beach	Kleentest Lab, Inc.
Los Angeles	Los Angeles-Long Beach	Lever Brothers
Los Angeles	Los Angeles-Long Beach	Lin-Sol Products, Inc.
Los Angeles	Los Angeles-Long Beach	Los Angeles Soap
Los Angeles	Los Angeles-Long Beach	Lunax Mfg. Chem., Cal.

State City	SMSA	Company
CALIFORNIA (cont.)		
Los Angeles	Los Angeles-Long Beach	MC Kay Mfg., Inc.
Los Angeles	Los Angeles-Long Beach	Mohr Laboratories
Los Angeles	Los Angeles-Long Beach	Oro Chemical
Los Angeles	Los Angeles-Long Beach	Pacific Soap
Los Angeles	Los Angeles-Long Beach	People Chemical, Inc.
Los Angeles	Los Angeles-Long Beach	Rex Chemical
Los Angeles	Los Angeles-Long Beach	Royal Soap & Chemical
Los Angeles	Los Angeles-Long Beach	Vivex Products
Los Angeles	Los Angeles-Long Beach	Western Cleansers, Inc.
Lynwood	Los Angeles-Long Beach	Witch Chemical, Inc.
Maywood	Los Angeles-Long Beach	Warner Allan
Monterey Park	Los Angeles-Long Beach	Greater American Chem.
Oakland	San Francisco-Oakland	Acme Soap
Oakland	San Francisco-Oakland	Del Chemical & Sup.
Oakland	San Francisco-Oakland	Michel & Pelton
Oakland	San Francisco-Oakland	P & S Sales, Inc.
Oakland	San Francisco-Oakland	Safeway Stores, Inc.
Oakland	San Francisco-Oakland	Sentinel Chemical
Orange	Anaheim-Santa Ana-Garden Grove	De Soto, Inc.
Orange	Anaheim-Santa Ana-Garden Grove	Mark Chemical, Inc.
Orange	Anaheim-Santa Ana-Garden Grove	Mohr Laboratories
Orange	Anaheim-Santa Ana-Garden Grove	Van Charles Lab
Sacramento	Sacramento	Lenox Laboratories, Inc.
Sacramento	Sacramento	Procter & Gamble Mfg.
Salinas	--	B-D Fertilizer Supply

State City	SMSA	Company
CALIFORNIA (cont.)		
San Carlos	San Francisco-Oakland	Brandel Chemicals
San Diego	San Diego	Wm. M. Goldberg
San Diego	San Diego	P M Chemical Inc.
San Diego	San Diego	Pacific Soap
San Diego	San Diego	Sun Products
San Fernando	Los Angeles-Long Beach	Riverton Chemical Corp.
San Francisco	San Francisco-Oakland	Amerace Esna Corp.
San Francisco	San Francisco-Oakland	Bray Construction
San Francisco	San Francisco-Oakland	Del Chemical & Supply
San Francisco	San Francisco-Oakland	Devries Laundry Supply
San Francisco	San Francisco-Oakland	On-Off Chemical Corp.
San Francisco	San Francisco-Oakland	P & S Sales, Inc.
San Francisco	San Francisco-Oakland	Pioneer Soap, Inc.
San Francisco	San Francisco-Oakland	Pryde Products
San Francisco	San Francisco-Oakland	Super Soap
San Francisco	San Francisco-Oakland	Wash-A-Knit
San Jose	San Jose	Bestline Products, Inc.
San Jose	San Jose	Chemart Labs of Calif.
San Jose	San Jose	N* (420-B Umbarger Rd.)
San Jose	San Jose	Oatey, Inc.
San Jose	San Jose	San Jose Tallow
San Mateo	San Francisco-Oakland	Poly-Tite Packages
Santa Clara	San Jose	ECCO Products, Inc.
Santa Fe Springs	Los Angeles-Long Beach	Chemical Enterprises
Santa Fe Springs	Los Angeles-Long Beach	Chemical Enterprises

State City	SMSA	Company
CALIFORNIA (cont.)		
Santa Fe Springs	Los Angeles-Long Beach	Matt Enterprises
Santa Fe Springs	Los Angeles-Long Beach	Pilot Chemical Cal.
Santa Fe Springs	Los Angeles-Long Beach	Pilot Chemical of Ohio
Santa Fe Springs	Los Angeles-Long Beach	Pilot Labs, Inc.
Santa Monica	Los Angeles-Long Beach	Indco Lab Products
Santa Monica	Los Angeles-Long Beach	Santa Monica Chemicals, Inc.
San Francisco	San Francisco-Oakland	Klix Chemical, Inc.
Stockton	Stockton	Mazzie Sales
Torrance	Los Angeles-Long Beach	Chemit
Union City	San Francisco-Oakland	Plex Chemical
Van Nuys	Los Angeles-Long Beach	Bell Chemical
Venice	Los Angeles-Long Beach	John De Witt
Whittier	Los Angeles-Long Beach	Champion Chemical
Wilmington	Los Angeles-Long Beach	U.S. Borax & Chem. Corp.
Wilmington	Los Angeles-Long Beach	U.S. Borax & Chem. Corp.
Wilmington	Los Angeles-Long Beach	Witfield Chemical Corp.
COLORADO		
Colorado Springs	Colorado Springs	Anchor Chemical
Colorado Springs	Colorado Springs	Industrial Chemical
Denver	Denver	Fenko Chemical
Denver	Denver	Lee Soap
Denver	Denver	PDR Mfg.
Denver	Denver	SOC Products
Denver	Denver	Zefer Products
Loveland	--	Loveland Chemical

State City	SMSA	Company
COLORADO (cont.)		
Wheatridge	Denver	Automotive Detail
CONNECTICUT		
Bridgeport	Bridgeport-Stamford-Norwalk	Aerosol Techniques
Bridgeport	Bridgeport-Stamford-Norwalk	Amodex Products Inc.
Bridgeport	Bridgeport-Stamford-Norwalk	Magic Water
Cheshire	Waterbury	U.S. Chemicals
Danbury	--	North American Dye
Derby	--	Stratford Chemical
Lakeville	--	Babbitt Products
Lakeville	--	Western Cleansers
Manchester	Hartford-New Britain	Ro-Vic Inc.
Milford	Bridgeport-Stamford-Norwalk	Aerosol Techniques, Inc.
Mystic	--	Cooper Laboratories
New Haven	New Haven	Arrow Laboratories
New Haven	New Haven	Edson Chemical, Inc.
New Haven	New Haven	Elgene
New Haven	New Haven	Krevit, H. & Co., Inc.
Norwalk	Bridgeport-Stamford-Norwalk	Duke Laboratories, Inc.
Southington	Hartford-New Britain	Solvent Recovery Service of N.E.
Springdale	--	Abisol Products
Westport	Bridgeport-Stamford-Norwalk	C. B. Dolge
DELAWARE		
New Castle	Wilmington	Delaware Sanities, Inc.
Smyrna	--	Revliss Products

State City	SMSA	Company
DISTRICT OF COLUMBIA		
Washington	Washington	Chase Chemical Corp.
Washington	Washington	Stern Chemical
FLORIDA		
Hialeah	Miami	Moonshine Chemical
Hialeah	Miami	Sunshine Soap
Jacksonville	Jacksonville	AAA Chemical, Inc.
Jacksonville	Jacksonville	Astro Products, Inc.
Jacksonville	Jacksonville	Shelmont, Inc.
Largo	Tampa-St. Petersburg	Manchester Corp., Inc.
Miami	Miami	Guarantee Soap & Chem.
Miami	Miami	Moss Soap & Chem.
Miami	Miami	Thor Chemical Sales Corp.
Miami	Miami	Universal Chemical
Pompano Beach	Fort Lauderdale-Hollywood	Commercial Capital
St. Petersburg	Tampa-St. Petersburg	Florida Laundry Cleaner Supply of Florida
St. Petersburg	Tampa-St. Petersburg	Gator Chemicals
St. Petersburg	Tampa-St. Petersburg	Geiger Products
Tampa	Tampa-St. Petersburg	Chemex Industries, Inc.
Tampa	Tampa-St. Petersburg	Jalcar Industries
Tampa	Tampa-St. Petersburg	Kleen All Laboratories
Tampa	Tampa-St. Petersburg	Purex Corp., Ltd.
Tampa	Tampa-St. Petersburg	Wallace Chemical Div.
GEORGIA		
Atlanta	Atlanta	Guardian Chemical

State City	SMSA	Company
GEORGIA (cont.)		
Atlanta	Atlanta	Hill Mfg.
Atlanta	Atlanta	New South Mfg., Inc.
Atlanta	Atlanta	Puritan Chemical
Atlanta	Atlanta	Vulcan Chemical
Augusta	Augusta	Procter & Gamble Mfg.
Forest Park	Atlanta	Morrison Chemical
Macon	Augusta	Procter & Gamble Mfg.
Snellville	Atlanta	Star Mfg., Inc.
Toccoa	--	Toccoa Detergent
HAWAII		
Honolulu	Honolulu	Royal Magic, Inc.
Honolulu	Honolulu	Standard Chemical Detergent
Waipahu	Honolulu	ABC Powder Soap
ILLINOIS		
Antioch	Chicago	St. Cyr Products
Arlington Heights	Chicago	Sanford Chem., Inc.
Aurora	Chicago	Alba Mfg., Inc.
Aurora	Chicago	Lite Soap, Inc.
Aurora	Chicago	Rochester Germicide
Bellwood	Chicago	Armour & Co.
Blue Island	Chicago	Haag Laboratories Inc.
Blue Island	Chicago	Surfact, Inc.
Carbondale	--	Technical Tape Corp.
Carpentersville	Chicago	Alberto-Culver

State City	SMSA	Company
ILLINOIS (cont.)		
Chicago	Chicago	Action Chemical
Chicago	Chicago	Aim Corp.
Chicago	Chicago	Aim Corp.
Chicago	Chicago	Allied Products
Chicago	Chicago	Ambassador Detergent
Chicago	Chicago	Apex Chemical
Chicago	Chicago	Aquapure Corp.
Chicago	Chicago	Armour-Dial, Inc.
Chicago	Chicago	Armour & Co.
Chicago	Chicago	Atar Chemical, Inc.
Chicago	Chicago	Babbitt Products, Inc.
Chicago	Chicago	Barton Chemical Corp.
Chicago	Chicago	Certified Chemical
Chicago	Chicago	Chemco Chemical, Inc.
Chicago	Chicago	Chicago Sanitary Products
Chicago	Chicago	Claire Mfg., Inc.
Chicago	Chicago	Compounded Products
Chicago	Chicago	Continental Oil
Chicago	Chicago	Wm. H. Cooper
Chicago	Chicago	Crown Mfg.
Chicago	Chicago	Darling-Delaware, Inc.
Chicago	Chicago	Eagle Chemical
Chicago	Chicago	Fence Painter Corp.
Chicago	Chicago	Grand Laboratories, Inc.
Chicago	Chicago	Herman Morton, Inc.

State City	SMSA	Company
ILLINOIS (cont.)		
Chicago	Chicago	Knox Laboratories
Chicago	Chicago	Knox Chemical
Chicago	Chicago	Kwik Kleen
Chicago	Chicago	Lanair Chemical Corp.
Chicago	Chicago	Lekko Soap
Chicago	Chicago	Master Sales
Chicago	Chicago	Midland Chemical Corp.
Chicago	Chicago	Nalco Chemical
Chicago	Chicago	Neo Chemical, Inc.
Chicago	Chicago	Portion-Pac Chemical
Chicago	Chicago	Procter & Gamble
Chicago	Chicago	Purex Corp., Ltd.
Chicago	Chicago	Regal Laboratories
Chicago	Chicago	Richardson
Chicago	Chicago	S & E Chemical
Chicago	Chicago	Schmidt Soap Products
Chicago	Chicago	Seco Mfg., Inc.
Chicago	Chicago	John Sexton
Chicago	Chicago	Stonetree Corp.
Chicago	Chicago	R. R. Street, Inc.
Chicago	Chicago	W. F. Straub, Inc.
Chicago	Chicago	Stutz Co.
Chicago	Chicago	West Chemical Products, Inc.
Chicago	Chicago	Roy Wilson Mfg.
Chicago	Chicago	Witco Chemical, Inc.

State City	SMSA	Company
ILLINOIS (cont.)		
Chicago	Chicago	Witco Chemical, Inc.
Chicago	Chicago	H. Lee Wolfe, Inc.
Chicago Heights	Chicago	Pennsalt Chemicals Corp.
Des Plaines	Chicago	De Soto, Inc.
Downers Grove	Chicago	Service Master Equipment
Evanston	Chicago	Innovations Unlimited
Freeport	--	Fine Laboratories, Inc.
Galesburg	--	Churchill Chemical
Hinsdale	Chicago	R. R. Street, Inc.
Kankakee	--	Simoniz
Lawrenceville	--	Witco Chemical, Inc.
Lemont	Chicago	Richardson
Lombard	Chicago	Seco Mfg., Inc.
Lombard	Chicago	Taylor-Carlson
Maywood	Chicago	Bleachering Products
Melrose Park	Chicago	Richardson
Mokena	Chicago	Woodland Products
Montgomery	Chicago	Armour-Dial, Inc.
Morton Grove	Chicago	Sharri Mfg., Ltd.
Naperville	Chicago	Ben Den Chemical
Olney	--	Gerald T. Benson
Rockford	Rockford	Pram
St. Charles	Chicago	Ralen Chemical Corp.
Skokie	Chicago	Chemical Ways Corp.
Skokie	Chicago	Roberts Detergents, Inc.

State City	SMSA	Company
ILLINOIS (cont.)		
Skokie	Chicago	Thor Chemical
Springfield	Springfield	Kalusoff, Ltd.
Wauconda	Chicago	N. B. Purdy Products
Waukegan	Chicago	Chem-Rite Products, Inc.
INDIANA		
Anderson	Anderson	Ledo Chemical
Dupont	--	Robert S. Kiefer
Evansville	Evansville	Evansville Associated Blind
Fort Wayne	Fort Wayne	Hammons Products, Inc.
Gary	Gary-Hammond-East Chicago	Anderson
Gary	Gary-Hammond-East Chicago	Anderson
Hammond	Gary-Hammond-East Chicago	Lever Bros.
Huntington	--	Huntington Laboratories
Indianapolis	Indianapolis	Brite
Indianapolis	Indianapolis	J. W. Gibson, Inc.
Indianapolis	Indianapolis	Safety Products
Jeffersonville	Louisville	Colgate-Palmolive
South Bend	South Bend	Jon Allin, Inc.
IOWA		
Boone	--	Schultz Labs Mfg., Inc.
Boone	--	Schultz Labs Mfg., Inc.
Burlington	--	Twentieth Century Mfg.
Cedar Rapids	Cedar Rapids	Schultz Shoe
Corydon	--	Biggs Battery
Des Moines	Des Moines	Des Moines Sanitary Supply

State City	SMSA	Company
IOWA (cont.)		
Des Moines	Des Moines	H & H Cleaner
Des Moines	Des Moines	Ray A. Lewis
Dubuque	Dubuque	Baxter Mfg.
Dubuque	Dubuque	Chemical Sales & Service
Keokuk	--	Beaty Products
Mason City	--	Chemco
Mason City	--	Stewart Simmons, Inc.
Sioux City	Sioux City	West Side Radiator Sales
Stratford	--	Smith Clement
Waterloo	Waterloo	Peters Chemical
KANSAS		
Atchinson	--	Kaufman Laboratories
Hutchinson	--	Mystic Mist Corp.
Hutchinson	--	Safeway Stores, Inc.
Kansas City	Kansas City	Central Chemical
Kansas City	Kansas City	Colgate-Palmolive
Kansas City	Kansas City	Procter & Gamble Mfg.
Wichita	Wichita	Industrial Chemical Lab.
KENTUCKY		
Ft. Thomas	Cincinnati	Camco Chemical, Inc.
Lexington	Lexington	General Detergents, Inc.
Louisville	Louisville	Berry Soap & Chemical
Louisville	Louisville	New Products, Inc.
Louisville	Louisville	R & L Laboratories

State City	SMSA	Company
KENTUCKY (cont.)		
Mt. Sterling	--	Hands Friends Products
Owensboro	--	Martin Laboratories
Shelbyville	--	C & T Products, Inc.
LOUISIANA		
Baton Rouge	Baton Rouge	B & B Cleaning
Gretna	New Orleans	Golden Chemical Corp.
Gretna	New Orleans	Technical Industrial
Lafayette	Lafayette	Barnes Emitt
Metairie	New Orleans	Poly-Chem, Inc.
New Orleans	New Orleans	Delta Chemical Lab
New Orleans	New Orleans	Gordon Mfg.
New Orleans	New Orleans	Kenneth J. Landry
New Orleans	New Orleans	R & H Products Inc.
New Orleans	New Orleans	Wm. B. Reily, Inc.
New Orleans	New Orleans	Rochester Germicide
New Orleans	New Orleans	Sun Chemical Products
Shreveport	Shreveport	Freeman Paper
Westlake	Lake Charles	Continental Oil
MAINE		
Biddeford	--	Chem-Lan of Biddeford
North Berwick	--	Wells Color & Chem.
Pittsfield	--	Northeast Dye & Chem.
Waterboro	--	Rollins Solution
MARYLAND		
Baltimore	Baltimore	Alpha Chemical

State City	SMSA	Company
MARYLAND (cont.)		
Baltimore	Baltimore	Chemical Specialties
Baltimore	Baltimore	Continental Oil
Baltimore	Baltimore	Dek, Inc.
Baltimore	Baltimore	Dentocide Chemical
Baltimore	Baltimore	Dynasurf Chemical Corp.
Baltimore	Baltimore	Laco Corp.
Baltimore	Baltimore	Lever Brothers
Baltimore	Baltimore	Mangels-Herold
Baltimore	Baltimore	Peerless Chemical
Baltimore	Baltimore	Procter & Gamble Mfg.
Baltimore	Baltimore	Procter & Gamble Mfg.
Baltimore	Baltimore	West Chemical Products
Baltimore	Baltimore	Westwood Chemical
Brentwood	Washington, D. C.	Caled Products, Inc.
St. Pleasant	Washington, D. C.	Arcal Chemicals, Inc.
Silver Spring	Washington, D. C.	Chemical Cleaning Products
MASSACHUSETTS		
Boston	Boston	Associated Chemicals Corp.
Boston	Boston	Atlas Color & Chem.
Boston	Boston	Benda Products
Boston	Boston	C. L. Erving, Inc.
Boston	Boston	Forest Hills Soap
Boston	Boston	Formulated Products, Inc.
Boston	Boston	Isoplex Corp.
Boston	Boston	Kemtech, Inc.

State City	SMSA	Company
MASSACHUSETTS (cont.)		
Boston	Boston	Masury-Columbia Corp.
Boston	Boston	Wye Industries, Inc.
Cambridge	Boston	Blue Bird
Cambridge	Boston	New England Soap
Chicopee	Springfield-Chicopee-Holyoke	Carrier Chemicals
E. Long Meadow	Springfield-Chicopee-Holyoke	Polychemical Products
Fall River	Fall River	Louis R. Cloutier
Greenfield	--	Louis P. Hershey
Holbrook	Boston	Britex Corp.
Holyoke	Springfield-Chicopee-Holyoke	Harvey Chem. Corp.
Holyoke	Springfield-Chicopee-Holyoke	Standard International
Lowell	Lowell	Textile Products
Malden	Boston	Neleco Products
Malden	Boston	Rochester Germicide
Marblehead	Boston	Hardwick Products, Inc.
Medfield	Boston	Win, Inc.
Medford	Boston	Mystic Wax
Medway	--	Veritas, Inc.
Middleboro	--	Rockland Industries, Inc.
Millis	Boston	Win, Inc.
Milton	Boston	Kemco, Inc.
Natick	Boston	Viking Mfg., Inc.
Newton	Boston	Enz Rust, Inc.
Newton	Boston	Household Research Corp.
Norwood	Boston	Warren Chemicals Mfg.

State City	SMSA	Company
MASSACHUSETTS (cont.)		
Palmer	Springfield-Chicopee-Holyoke	G N R Corp.
Quincy	Boston	Procter & Gamble Mfg.
Saugus	Boston	Alwin Color & Chemical
Scituate	Boston	George A. Coulston
Somerville	Boston	Minute Soap
Somerville	Boston	Phillips Corp.
South Berlin	Worcester	Hercules Kalon
Wakefield	Boston	Starr Chemical
Webster	--	Bercen Chemical, Inc.
Westfield	Springfield-Chicopee-Holyoke	Duo Chemical Corp.
Woburn	Boston	Flash Sales, Inc.
Worcester	Worcester	Samra Chemical Products
MICHIGAN		
Bessemer	--	Works, Bob Laboratories
Birmingham	Detroit	Blue Flash Chemical
Burt Lake	--	Levernier
Dearborn	Detroit	Automotive Finishes
Detroit	Detroit	Abso-Clean Chemical
Detroit	Detroit	American Shorten Oil
Detroit	Detroit	Al Balk, Associates
Detroit	Detroit	Elwood Chemical
Detroit	Detroit	Etsol Synthetic Products, Inc.
Detroit	Detroit	Franks Finst Soap Cleaning Powder
Detroit	Detroit	Gem Products & Mfg.
Detroit	Detroit	Hooker Chemical Corp.

State City	SMSA	Company
MICHIGAN (cont.)		
Detroit	Detroit	Kimberley Chemical Indus.
Detroit	Detroit	National Soap
Detroit	Detroit	National Soap
Detroit	Detroit	Nelson Chemicals
Detroit	Detroit	Peerless Chemical
Detroit	Detroit	John Sexton
Detroit	Detroit	Ralph Shrader, Inc.
Detroit	Detroit	Steel Bright Products
Detroit	Detroit	Stone Soap
Detroit	Detroit	Stone Soap
Detroit	Detroit	Sun Cleanser, Inc.
Detroit	Detroit	Sunrise Supply
East Lansing	Lansing	House of Howard, Inc.
Farmington	Detroit	R & R Products, Inc.
Flint	Flint	Lifeguard Products, Inc.
Grand Rapids	Grand Rapids	Living Products Corp.
Grand Rapids	Grand Rapids	Shurdol Chemical Corp.
Grand Rapids	Grand Rapids	F. J. Thomas Chem.
Grandville	Grand Rapids	Progress Chemical
Holland	Grand Rapids	Shur-Dol Chemical Corp.
Jackson	Jackson	Motor State Oil Grease
Kalamazoo	Kalamazoo	Fitzpatrick Bros., Inc.
Lincoln Park	Detroit	R & L Industrial Soap
Melvindale	Detroit	Med-Fac Laboratories, Inc.
Monroe	Toledo	Tropical Soap

State City	SMSA	Company
MICHIGAN (cont.)		
Mt. Pleasant	--	Chemical Mfg.
Muskegon	Muskegon-Muskegon Heights	General Laboratories
Muskegon	Muskegon-Muskegon Heights	Lakeway Chemicals, Inc.
Novi	Detroit	R & R Products Inc.
Port Huron	--	Port Huron Detergent
Saginaw	Saginaw	Advanco Laboratories
Saginaw	Saginaw	Sugar Beet Products
Taylor	Detroit	Fre-Wa Enterprises, Inc.
Taylor	Detroit	Leukaid Products
Utica	Detroit	Eagle Mineral & Chemical
MINNESOTA		
Crookston	--	Clean-ups
Hopkins	Minneapolis-St. Paul	Savoie Supply, Inc.
Litchfield	--	Anderson Chemical
Minneapolis	Minneapolis-St. Paul	Adams Products, Inc.
Minneapolis	Minneapolis-St. Paul	Coppess Corp.
Minneapolis	Minneapolis-St. Paul	Dalco Corp.
Minneapolis	Minneapolis-St. Paul	Grace Lee Products
Minneapolis	Minneapolis-St. Paul	Great Western Lab
Minneapolis	Minneapolis-St. Paul	National-Purity Sp. Chemicals
Minneapolis	Minneapolis-St. Paul	National Comp. Engineers
Minneapolis	Minneapolis-St. Paul	Sentinel Soap & Chem.
Minneapolis	Minneapolis-St. Paul	Stewart Chemical
Rochester	Rochester	Lystad, Inc.

State City	SMSA	Company
MINNESOTA (cont.)		
St. Paul	Minneapolis-St. Paul	B & G Products
St. Paul	Minneapolis-St. Paul	Fox Chemical
St. Paul	Minneapolis-St. Paul	L & Z Products, Inc.
St. Paul	Minneapolis-St. Paul	Lan-O-Sheen
St. Paul	Minneapolis-St. Paul	Earl W. Lewis
St. Paul	Minneapolis-St. Paul	Lynde
St. Paul	Minneapolis-St. Paul	M-M Distributing
St. Paul	Minneapolis-St. Paul	Minnesota Chem.
St. Paul	Minneapolis-St. Paul	H. V. Smith
Winona	--	Watkins Products, Inc.
MISSISSIPPI		
Greenville	--	Tabco Mfg.
Jackson	Jackson	Preferred Chemicals
Monticello	--	Zip Mfg.
MISSOURI		
Hazelwood	St. Louis	Schultz Shoe, Inc.
Henrietta	--	Tabers Products, Inc.
Kansas City	Kansas City	Glue & Paste Mfg. & Distr.
Kansas City	Kansas City	Mo-Kans Chem.
Kansas City	Kansas City	North American Chemical
St. Louis	St. Louis	Abacas, Inc.
St. Louis	St. Louis	Critzas Industries, Inc.
St. Louis	St. Louis	Derrick Soap Products
St. Louis	St. Louis	Du Good Chemical
St. Louis	St. Louis	Freesmeier Laboratories

State City	SMSA	Company
MISSOURI (cont.)		
St. Louis	St. Louis	Frontier Chemicals, Inc.
St. Louis	St. Louis	Hohn Mfg.
St. Louis	St. Louis	Industrial Soap, Inc.
St. Louis	St. Louis	Lever Brothers
St. Louis	St. Louis	Mozel Chemical Products
St. Louis	St. Louis	Novel Wash, Inc.
St. Louis	St. Louis	UN Brands, Inc.
St. Louis	St. Louis	Packwood Mfg.
St. Louis	St. Louis	Pecks Products
St. Louis	St. Louis	Permaclean Laboratory
St. Louis	St. Louis	Procter & Gamble Mfg.
St. Louis	St. Louis	Procter & Gamble Mfg.
St. Louis	St. Louis	Purex Corp., Ltd.
St. Louis	St. Louis	Red Stripe Chemicals
St. Louis	St. Louis	Reeno Sales Corp.
St. Louis	St. Louis	D. A. Robinson Mfg.
St. Louis	St. Louis	Harry B. Russell
St. Louis	St. Louis	Sayman Products
St. Louis	St. Louis	Skasol Corp.
St. Louis	St. Louis	Sterling Soap, Inc.
St. Louis	St. Louis	Stewart Chemical
St. Louis	St. Louis	Stewart Chemical Products
Sedalia	--	Adco, Inc.
Wentzille	St. Louis	Metalife

State City	SMSA	Company
MONTANA		
Sidney	--	Ideal Products, Inc.
NEBRASKA		
Omaha	Omaha	Chemical Products
Omaha	Omaha	Industrial Chemical Lab.
Omaha	Omaha	Purex Corp., Ltd.
Omaha	Omaha	Tidy House Products
Randolph	--	Hi Tone Soap
NEW HAMPSHIRE		
Keene	--	EDJE, Inc.
Laconia	--	Lakewood Chemical
NEW JERSEY		
Bayonne	Jersey City	Diamond Chem., Inc.
Belleville	Newark	Northeast Chemical Corp.
Bernardsville	--	Jersey Industries, Inc.
Bogota	Paterson-Clifton-Passaic	Stanson Chemical, Inc.
Bordentown	Philadelphia	Stephan Chem., Inc.
Caldwell	Newark	Sumco, Inc.
Camden	Philadelphia	Concord Chemical
Camden	Philadelphia	Curley, Inc.
Camden	Philadelphia	Harley Chemical, Inc.
Carlstadt	Paterson-Clifton-Passaic	Airwick Industries, Inc.
Carlstadt	Paterson-Clifton-Passaic	Wasco, Inc.
Cedar Grove	Newark	Almo Laboratories, Inc.
Chester	Newark	Quimby

State City	SMSA	Company
NEW JERSEY (cont.)		
Clifton	Paterson-Clifton-Passaic	Anscott Chemical Indus.
Clifton	Paterson-Clifton-Passaic	Armour & Co.
Cranford	Newark	Harco Chemical, Inc.
E. Brunswick	--	Fried Industries
E. Paterson	Paterson-Clifton-Passaic	Gamlen Chemical, Inc.
Edgewater	Paterson-Clifton-Passaic	Lever Brothers
Elizabeth	Paterson-Clifton-Passaic	Emkay Chemical
Elizabeth	Paterson-Clifton-Passaic	Laundry Products Corp.
Passaic	Paterson-Clifton-Passaic	J. L. Prescott, Inc.
Ft. Lee	Paterson-Clifton-Passaic	Adco Chemical Corp.
Garfield	Paterson-Clifton-Passaic	Coastal Chemical Corp.
Hackensack	Paterson-Clifton-Passaic	Premier Industrial Corp.
Hawthorne	Paterson-Clifton-Passaic	Carpet Pite Industries
Hawthorne	Paterson-Clifton-Passaic	Heerema
Hoboken	Jersey City	National Cleanser Products
Hoboken	Jersey City	Standard Chemical Products
Jersey City	Jersey City	Arol Chemical Products
Jersey City	Jersey City	Arol Chemical Products
Jersey City	Jersey City	Chemical Compounding Corp.
Jersey City	Jersey City	Colgate Palmolive
Jersey City	Jersey City	Fabric Chemical Corp.
Kearny	Jersey City	Economic Products, Inc.
Kearny	Jersey City	Howland Chemical Products
Kearny	Jersey City	Theobald Industries
Lodi	Paterson-Clifton-Passaic	Kem Laboratories, Inc.
Lodi	Paterson-Clifton-Passaic	Manhattan Products, Inc.

State City	SMSA	Company
NEW JERSEY (cont.)		
Lyndhurst	Paterson-Clifton-Passaic	Ardmore Chemical
Moorestown	Philadelphia	Garden State Chemicals
Newark	Newark	Crystal Chemical
Newark	Newark	Diversey Corp.
Newark	Newark	Empire Chemical Products
Newark	Newark	Epoca Corp.
Newark	Newark	Fluid Chemicals, Inc.
Newark	Newark	Helbar Chemical Corp.
Newark	Newark	Luxury Soap
Newark	Newark	Northeast Chemical Corp.
Newark	Newark	Ortex Products, Inc.
Northvale	Paterson-Clifton-Passaic	TECT, Inc.
Passaic	Paterson-Clifton-Passaic	Chemitex Mfg.
Paterson	Paterson-Clifton-Passaic	H & N Chemical, Inc.
Paterson	Paterson-Clifton-Passaic	Hamilton Oil
Paterson	Paterson-Clifton-Passaic	North American Chemicals
Paterson	Paterson-Clifton-Passaic	Richardson, Inc.
Paterson	Paterson-Clifton-Passaic	Sanitary Soap
Paterson	Paterson-Clifton-Passaic	Witco Chem., Inc.
Pennsauken	Philadelphia	Dunn Chem., Inc.
Pitman	Philadelphia	Delaware Valley Amer. Lab.
Sayreville	--	Fine Organics, Inc.
Tenafly	Paterson-Clifton-Passaic	Fender Fuel, Inc.
Trenton	Trenton	L & M Enterprises, Inc.
Trenton	Trenton	United Research & Development Assoc.

State City	SMSA	Company
NEW JERSEY (cont.)		
Vineland	--	Emarkay Laboratories
NEW MEXICO		
Farmington	--	WYCOFF
NEW YORK		
Albany	Albany-Schenectady-Troy	Albany Soap Corp.
Albany	Albany-Schenectady-Troy	B. T. Babbitt, Inc.
Angola	Buffalo	Blae, Inc.
Buffalo	Buffalo	Abradant Products Inc.
Buffalo	Buffalo	Daniel E. Boland
Buffalo	Buffalo	Family Home Products
Buffalo	Buffalo	Gardiner Mfg., Inc.
Buffalo	Buffalo	Getzol Products Corp.
Buffalo	Buffalo	Suds-Up
Buffalo	Buffalo	Veo Products
Canandaigua	--	Ira T. Morris
College Point	New York	Chemclean Corp.
Farmingdale	New York	Rapid Soap
Farmingdale	New York	Sunshine Chemical Corp.
Freeport	New York	Townco, Inc.
Geneseo	Rochester	Balding Products, Inc.
Glen Cove	New York	Mary Chess, Inc.
Glen Oaks	New York	Sava Industries, Inc.
Great Neck	New York	Topper Mfg., Inc.
Haverstraw	New York	Neptune Chemical Corp. Am.
Homer	--	R. H. Miller, Inc.

State City	SMSA	Company
NEW YORK (cont.)		
Ithaca	--	Pecks Products, Inc.
Jamaica	New York	Charmed Circle of Soap
Jamaica	New York	Flower Talk, Inc.
Jamaica	New York	Inner Cities Chem.
Johnstown	--	Crown
Long Island	New York	Vita Kleen, Inc.
Long Island	New York	West Chemical Products, Inc.
Mamaroneck	New York	Elgene Chem., Inc.
Mamaroneck	New York	Improved Hospital Dye Detergents
Mariners Harbor	New York	Procter & Gamble Mfg.
Middle Village	New York	Martens Chem.
Mt. Vernon	New York	Mitchell Mfg. Corp.
Mt. Vernon	New York	Parke-Hill Chem. Corp.
New Hyde Park	New York	Dubow Chem. Corp.
New Hyde Park	New York	ZOE Chem., Inc.
Bronx	New York	Kusiel Chem., Inc.
Bronx	New York	S & S Soap
Bronx	New York	Safeguard Chem.
Bronx	New York	Sunbright Color & Chem.
Brooklyn	New York	Alexander Chem.
Brooklyn	New York	Aurora Mfg.
Brooklyn	New York	Azee Soap
Brooklyn	New York	Brunswick Soap, Inc.
Brooklyn	New York	Chem. By Bilco, Inc.
Brooklyn	New York	Chloral Chem. Corp.

State City	SMSA	Company
NEW YORK (cont.)		
Brooklyn	New York	Corbin Chem. Corp.
Brooklyn	New York	Duveen Soap Corp.
Brooklyn	New York	Epic Chem., Inc.
Ridgewood	New York	Florozone
Brooklyn	New York	Glissen Chem.
Brooklyn	New York	Grestco Dyes & Chem.
Brooklyn	New York	Jewel Chemical Specialty, Inc.
Brooklyn	New York	Krakt Surgical Instruments, Inc.
Brooklyn	New York	W. B. McVicker, Inc.
Brooklyn	New York	New York Soap, Inc.
Brooklyn	New York	Nuvite Chem. Cpds.
Brooklyn	New York	Oil Spc Refining
Brooklyn	New York	Orbit, Inc.
Brooklyn	New York	Purex Corp., Ltd.
Brooklyn	New York	Real Solvent, Inc.
Brooklyn	New York	Richefluer Labs
Brooklyn	New York	Rosenfeld & Sons
Brooklyn	New York	M. Schneider & Sons, Inc.
Brooklyn	New York	Schnapp Enterprises, Inc.
Brooklyn	New York	Star Soap & Candle
Brooklyn	New York	Stahl Soap
Brooklyn	New York	Trio Chem. Works, Inc.
Brooklyn	New York	Twi-Laq Chem., Inc.
Brooklyn	New York	Van Buren Laboratories
Brooklyn	New York	Vanda Products, Ltd.

State City	SMSA	Company
NEW YORK (cont.)		
Brooklyn	New York	Wolf Soap, Inc.
Brooklyn	New York	Zodiac Laboratories, Inc.
New York	New York	Abert Products, Inc.
New York	New York	Alconox, Inc.
New York	New York	American Home Products Corp.
New York	New York	Ashby, Inc.
New York	New York	Barbour Spec, Inc.
New York	New York	Bee-Kem Products, Inc.
New York	New York	Bonrock Corp.
New York	New York	C M C Lab Co.
New York	New York	Chemical Detergents
New York	New York	Colgate Palmolive
New York	New York	Crystal Chemical Corp.
New York	New York	Deltex Industries, Inc.
New York	New York	Diaperwite, Inc.
New York	New York	Glad-Eze Products Corp.
New York	New York	House of Danilon, Inc.
New York	New York	Joni Lowrie, Inc.
New York	New York	Lever Brothers
New York	New York	Manstan Chem. Corp.
New York	New York	N* (100 Park Ave.)
New York	New York	National Cleanser Products
New York	New York	A. P. Ordway
New York	New York	Rad., Inc.
New York	New York	Texstar Chem. Corp.

State City	SMSA	Company
NEW YORK (cont.)		
New York	New York	Utility, Inc.
New York	New York	Witfield Chem. Corp.
New York	New York	Witco Chem. Corp.
New York	New York	Woolfoam Corp.
Pearl River	New York	Perfection Beauty Products
Plattsburgh	--	Adirondack Chem.
Port Richmond	New York	White House Chem.
Queens Village	New York	Makoor Soap
Red Hook	--	Voorhis-Tiebout, Inc.
Rochester	Rochester	Genchase Products
Rochester	Rochester	General Detergents Corp.
Rochester	Rochester	Kleen-Brite Chem.
Rochester	Rochester	Lenora Soap Mfg., Inc.
Rochester	Rochester	Magic Suds Soap, Inc.
Rochester	Rochester	Milk Plant Specialties
Rochester	Rochester	Purepak Products, Inc.
Rochester	Rochester	Rochester Germicide
Rome	Utica-Rome	Baums Castorine
Schenectady	Albany-Schenectady-Troy	Kenco Chemical
Spring Valley	New York	America Polychemical Mfg.
Spring Valley	New York	Hillcrest Lab., Inc.
Spring Valley	New York	Polychem Home Products
Spring Valley	New York	U.S. Polychemical Corp.
Tonawanda	Buffalo	Etco Products, Inc.
Tully	Syracuse	Detabgent Corp.
Valley Stream	New York	Alpha Chemical Products

State City	SMSA	Company
NEW YORK (cont.)		
Walden	--	Sana Scent
Warwick	--	Barrier Chem., Inc.
Hempstead	New York	Polyphase Chemical Service, Inc.
White Plains	New York	Arrow Laboratories, Inc.
White Plains	New York	Gill Thomas Soap
White Plains	New York	E. F. Westfield
Woodside	New York	Products of Blind Workers
Yonkers	New York	Raybeam Mfg.
NORTH CAROLINA		
Asheboro	--	Miracle Cleaners
Charlotte	Charlotte	Acme Soap & Chemical
Charlotte	Charlotte	Card Chemical Corp.
Charlotte	Charlotte	Chemical Products, Inc.
Elon College	--	Associated Chem.
Greensboro	Greensboro-Winston-Salem-High Point	Cindet Chem., Inc.
Greenville	--	Unichem, Inc.
High Point	Greensboro-Winston-Salem-High Point	High Point Chemical Corp.
High Point	Greensboro-Winston-Salem-High Point	Kay Chem., Inc.
High Point	Greensboro-Winston-Salem-High Point	Rite Color & Chem., Inc.
High Point	Greensboro-Winston-Salem-High Point	Welborn Cleaner Products
Morganton	--	Springs Chem.
Oriental	--	Harris Crafts, Inc.
Pinehurst	--	Pinehurst Handmade Soap & Candle
Raleigh	Raleigh	Simon & Senoras, Inc.
Sanford	--	Derma-Teen

State City	SMSA	Company
NORTH CAROLINA (cont.)		
Sanford	--	Sandhill Industries
Southern Pines	--	Carolina, Inc.
Thomasville	--	Grestco Dyes & Chem.
Wilmington	Wilmington	Southeastern Chemical Works
Winston-Salem	Greensboro-Winston-Salem-High Point	Rumley Mfg. Corp.
Winston-Salem	Greensboro-Winston-Salem-High Point	Sta-Soft Mfg.
NORTH DAKOTA		
Devils Lake	--	Lystad, Inc.
OHIO		
Akron	Akron	Gojer, Inc.
Akron	Akron	Kristee Products
Cincinnati	Cincinnati	Emery Industries, Inc.
Cincinnati	Cincinnati	Emery Industries, Inc.
Cincinnati	Cincinnati	Fischer Davila Industries, Inc.
Cincinnati	Cincinnati	Fischer Heinrich & Co.
Cincinnati	Cincinnati	Fry Bros.
Cincinnati	Cincinnati	Grandpa Brands
Cincinnati	Cincinnati	Jergens Andrew
Cincinnati	Cincinnati	Johnson & Gordon Janitor
Cincinnati	Cincinnati	Kennedy Products
Cincinnati	Cincinnati	Kutol Products
Cincinnati	Cincinnati	Malibu Industries
Cincinnati	Cincinnati	Oil Kraft, Inc.
Cincinnati	Cincinnati	Pilot Chem. Ohio
Cincinnati	Cincinnati	Procter & Gamble Mfg.

State City	SMSA	Company
OHIO (cont.)		
Cincinnati	Cincinnati	Procter & Gamble Mfg.
Cincinnati	Cincinnati	Procter & Gamble Mfg.
Cincinnati	Cincinnati	Texo Corp.
Cincinnati	Cincinnati	Wissell Soap & Chem.
Cleveland	Cleveland	A & A Mfg.
Cleveland	Cleveland	Amazo Laboratories, Inc.
Cleveland	Cleveland	Chemical Industries
Cleveland	Cleveland	Crow Chem.
Cleveland	Cleveland	Dean Supply
Cleveland	Cleveland	Grossner Leondard
Cleveland	Cleveland	Guardian of Cleveland
Cleveland	Cleveland	Kanner Industries, Inc.
Cleveland	Cleveland	Kay Chem. Corp.
Cleveland	Cleveland	Mooney Chem., Inc.
Cleveland	Cleveland	Mooney Chem., Inc.
Cleveland	Cleveland	Murphy-Phoenix
Cleveland	Cleveland	Murphy-Phoenix
Cleveland	Cleveland	Ohio Soap Products
Cleveland	Cleveland	Pioneer Mfg.
Cleveland	Cleveland	Reliance Chem.
Cleveland	Cleveland	Sabern Products
Cleveland	Cleveland	Saxton Mfg.
Cleveland	Cleveland	Skotch Products Corp.
Cleveland	Cleveland	Solar Peabody Corp.
Cleveland	Cleveland	St. Petersburg Chem. Sal.

State City	SMSA	Company
OHIO (cont.)		
Cleveland	Cleveland	Sweet Clean Products
Cleveland	Cleveland	George L. Williams
Columbus	Columbus	Dysart Chem. Corp.
Columbus	Columbus	Hubman Supply
Columbus	Columbus	Keever
Columbus	Columbus	Keever
Columbus	Columbus	Melfi Carmen
Columbus	Columbus	Midco Products, Inc.
Columbus	Columbus	Neal Soap & Chem.
Columbus	Columbus	Powdered Products
Dayton	Dayton	Davies-Young Soap
Dayton	Dayton	Hewitt Soap
Dayton	Dayton	Master Cleaning Equipment Mfg.
Delaware	Columbus	Pennsalt Chemical Corp.
Granville	--	Granville Solvents, Inc.
Junction City	--	Willard T. Richards
Lakeview	--	Marlyn Chem.
Madison	Cleveland	Murphy-Phoenix
Milford	Cincinnati	Tri Mark Products, Inc.
North Olmsted	Cleveland	National Sanitary Products
Piqua	Dayton	Blue Magic of Ohio
Pleasant Plain	Cincinnati	William C. Moore
Portsmouth	--	Selby Chem., Inc.
Ross	Hamilton-Middletown	Nease Chem., Inc.
Spencerville	Lima	Thomson Chem., Inc.

State City	SMSA	Company
OHIO (cont.)		
Springfield	Springfield	Wetalene Laboratories
Toledo	Toledo	Cardinal Chem.
Toledo	Toledo	La France Toledo
Toledo	Toledo	Sinclair Mfg.
Weston	Toledo	Cresset Chem., Inc.
Weston	Toledo	Petrodyne Industries
OKLAHOMA		
Bethany	Oklahoma City	Jim J. Moon
Nowata	--	Teck Labs, Inc.
Oklahoma City	Oklahoma City	Edco Chem.
Oklahoma City	Oklahoma City	H & M Mfg. & Distributing
Oklahoma City	Oklahoma City	McNutt Industries
Oklahoma City	Oklahoma City	Mid-Continent Chem.
Oklahoma City	Oklahoma City	Mid-Continent Chem.
Pauls Valley	--	Jackson Machine
Sapulpa	Tulsa	Joe C. Naifeh
Tulsa	Tulsa	Brainerd Chem., Inc.
Tulsa	Tulsa	Detergent Engr.
Tulsa	Tulsa	Easy Car Wash Sys., Inc.
Tulsa	Tulsa	Remwood Chem.
OREGON		
Portland	Portland	E. H. Anderson
Portland	Portland	Associated Chemists
Portland	Portland	Sam A. Battaglia
Portland	Portland	Cleanup

State City	SMSA	Company
OREGON (cont.)		
Portland	Portland	Cleanup Hand Cleaner
Portland	Portland	Click Chemical Sanitation Supply
Portland	Portland	Hodge Chem.
Portland	Portland	Klix Chem. Oregon
Portland	Portland	Mt. Hood Chem. Corp.
Portland	Portland	Rose City Soap
PENNSYLVANIA		
Allentown	Allentown-Bethlehem-Easton	Jo Har Enterprises
Blairsville	--	R. C. Jones Chem.
Bradford	--	Teck Labs
Bryn Mawr	Philadelphia	Bryn Mawr Products
Carnegie	Pittsburgh	Penumatic Concrete Corp.
Childs	Scranton	Commercial Indus. Products
Collingdale	Philadelphia	Mione Mfg.
Conshohocken	Philadelphia	Sparkle Products
Cornwells Heights	Philadelphia	Eddington Laboratories
Cornwells Heights	Philadelphia	Pennsalt Chem. Corp.
Drexel Hill	Philadelphia	Thomas J. Brady
Drexel Hill	Philadelphia	Murphy Laboratories, Inc.
Erie	Erie	Eazo Washing Fluid
Franklin	--	Mooney Chem., Inc.
Franklin	--	Witco Chem. Corp.
Harrisburg	Harrisburg	Kol Foam, Inc.
Lansdale	Philadelphia	Crystal Soap & Chem.
Levittown	Philadelphia	Crest Research Products

State City	SMSA	Company
PENNSYLVANIA (cont.)		
McKees Rocks	Pittsburgh	Apex Soap & Sanitary
Mohnton	Reading	Cavalier Mfg. Corp.
Mt. Carmel	--	Miccio Joseph
New Castle	--	New Castle Fluid Chem.
New Stanton	Pittsburgh	Norman E. Hyde Labs
Peckville	Scranton	Marconi Mfg., Inc.
Philadelphia	Philadelphia	Advanced Chem., Inc.
Philadelphia	Philadelphia	Arco Chem. Corp.
Philadelphia	Philadelphia	Ardex Laboratories, Inc.
Philadelphia	Philadelphia	Auerbach Chem., Inc.
Philadelphia	Philadelphia	M. C. Block, Inc.
Philadelphia	Philadelphia	Custom Blends, Inc.
Philadelphia	Philadelphia	Day & Frick, Inc.
Philadelphia	Philadelphia	Dunn Chem., Inc.
Philadelphia	Philadelphia	Alex C. Fergusson
Philadelphia	Philadelphia	Gartsides Iron Rust Soap
Philadelphia	Philadelphia	James Good Co.
Philadelphia	Philadelphia	N. Jonas, Inc.
Philadelphia	Philadelphia	Klenz-A-Rama Chem.
Philadelphia	Philadelphia	Laurel Products Corp.
Philadelphia	Philadelphia	Kerros Soap & Chemicals
Philadelphia	Philadelphia	Mollen Chem.
Philadelphia	Philadelphia	National Milling & Chem.
Philadelphia	Philadelphia	National Chemical Lab. Pa.
Philadelphia	Philadelphia	Purex Corp., Ltd.
Philadelphia	Philadelphia	Sanders Chem.

State City	SMSA	Company
PENNSYLVANIA (cont.)		
Philadelphia	Philadelphia	E. B. Synder Labs., Inc.
Philadelphia	Philadelphia	Standard Chem.
Philadelphia	Philadelphia	Talk Industries
Philadelphia	Philadelphia	Tower Products, Inc.
Philadelphia	Philadelphia	Valo Chem.
Philadelphia	Philadelphia	Williams Soap Chem.
Philadelphia	Philadelphia	Yankee Chem.
Pittsburgh	Pittsburgh	Allied Block Chem.
Pittsburgh	Pittsburgh	F. L. Falch
Pittsburgh	Pittsburgh	Lustre, Inc.
Pittsburgh	Pittsburgh	Pneumatic Concrete Corp.
Pittsburgh	Pittsburgh	Pneumatic Concrete Corp.
Pittsburgh	Pittsburgh	Save Products
Pittsburgh	Pittsburgh	Gus J. Schaffner, Jr.
Pittsburgh	Pittsburgh	Sweet Mfg., Inc.
Pittston	Wilkes-Barre-Hazelton	Starlight Chem.
Plymouth	Wilkes-Barre-Hazelton	Sanitary Chemical
Reading	Reading	Hans C. Bick, Inc.
Reading	Reading	Eastern Chem. Corp.
Reading	Reading	Goodwill Chem., Inc.
Reading	Reading	Lincoln Indus. Chem.
Reading	Reading	Misco Products Corp.
Reading	Reading	Pagoda Industries
Reading	Reading	Rix Chem., Inc.
Rochester	Pittsburgh	Beaver Aklali Products

State City	SMSA	Company
PENNSYLVANIA (cont.)		
Scranton	Scranton	James Products
State College	--	Nease Chem., Inc.
Tamaqua	--	Alfred Wedrow
Turbotville	--	Paulco Products, Inc.
Uniontown	--	Crawford Bros.
Verona	Pittsburgh	Far-Best Corp.
York	York	All Purpose Concentrates
York	York	Gent-L-Kleen Products, Inc.
RHODE ISLAND		
Ashton	Providence-Pawtucket-Warwick	Kenneth W. Dehertogh
Bristol	Providence-Pawtucket-Warwick	Fairpoint Mfg.
Pawtucket	Providence-Pawtucket-Warwick	Dytex Chem.
Providence	Providence-Pawtucket-Warwick	Aborn Chem. Industries
Providence	Providence-Pawtucket-Warwick	Adams Chem.
Providence	Providence-Pawtucket-Warwick	Crown Chemical Corp.
Providence	Providence-Pawtucket-Warwick	Simmons, Kenneth
Rumford	Providence-Pawtucket-Warwick	J. L. Prescott, Inc.
Warwick	Providence-Pawtucket-Warwick	All-Tex Specialty
West Warwick	Providence-Pawtucket-Warwick	Original Bradford Soap
West Warwick	Providence-Pawtucket-Warwick	Rimass Products
West Warwick	Providence-Pawtucket-Warwick	Soluol Chem., Inc.
Woonsocket	Providence-Pawtucket-Warwick	Lanex Chem.
Woonsocket	Providence-Pawtucket-Warwick	Woonsocket Color & Chem.
SOUTH CAROLINA		
Columbia	Columbia	Edco Chem., Inc.

State City	SMSA	Company
SOUTH CAROLINA (cont.)		
Greenville	Greenville	Texize Chem., Inc.
Spartanburg	--	Moretex Chem.
TENNESSEE		
Arlington	Memphis	Graco Sales
Cleveland	--	Manufacturers Soap Chem.
Knoxville	Knoxville	J & J Chem., Inc.
Knoxville	Knoxville	R. J. Quigg Chem.
Martin	--	Kleen Krest Chem.
Memphis	Memphis	Chem Specialties, Inc.
Memphis	Memphis	Ettes Products
Memphis	Memphis	Superior Mfg. Corp.
Memphis	Memphis	Superior National Mfg.
Memphis	Memphis	Tri Chem Products
Memphis	Memphis	Valley Products, Inc.
Nashville	Nashville	Sanitrol Products, Inc.
Nashville	Nashville	Yale Chem.
TEXAS		
Abilene	Abilene	Bass Soap
Amarillo	Amarillo	Carpet Master Rug Cleaners
Amarillo	Amarillo	Dorm Corp.
Austin	Austin	Sandys Supply
Beaumont	Beaumont-Port Arthur-Orange	Modern, Inc.
Beaumont	Beaumont-Port Arthur-Orange	Modern, Inc.
Copperas Cove	--	Monroe Products Inc.
Dallas	Dallas	All Rite Laboratories

State City	SMSA	Company
TEXAS (cont.)		
Dallas	Dallas	Associated Chem., Ind.
Dallas	Dallas	Thomas F. Bledsoe
Dallas	Dallas	Break-Thru Products, Inc.
Dallas	Dallas	D. P. Chem., Inc.
Dallas	Dallas	DAL Industrial Products
Dallas	Dallas	Diamond Shamrock Corp.
Dallas	Dallas	Ecco Chem., Inc.
Dallas	Dallas	Economics Lab., Inc.
Dallas	Dallas	George B. Kelly Mfg.
Dallas	Dallas	Macs Service & Supply
Dallas	Dallas	Macs Service & Supply
Dallas	Dallas	McGugan Chem., Inc.
Dallas	Dallas	H. B. Meyer & Son
Dallas	Dallas	H. B. Meyer & Son
Dallas	Dallas	Pennsalt Chem. Corp.
Dallas	Dallas	Petro Mfg. Corp.
Dallas	Dallas	Power Jet Chem. Corp.
Dallas	Dallas	Procter & Gamble Mfg.
Dallas	Dallas	Procter & Gamble Mfg.
Dallas	Dallas	Research Products
Dallas	Dallas	Fred Richards
Dallas	Dallas	Southland Chem. Corp.
Fort Worth	Fort Worth	Fleetwash, Inc.
Fort Worth	Fort Worth	Mid-Continent Chem.
Fort Worth	Fort Worth	Panther Chem., Inc.

State City	SMSA	Company
TEXAS (cont.)		
Fort Worth	Fort Worth	Petrochemicals, Inc.
Fort Worth	Fort Worth	Roland Co.
Fort Worth	Fort Worth	Southwest Soaps Chem., Inc.
Fort Worth	Fort Worth	Speede Products
Fort Worth	Fort Worth	Washington Chemical Sal. Tex.
Garland	Dallas	Carroll
Garland	Dallas	Eagle Products, Inc.
Garland	Dallas	Greene Enterprises, Inc.
Garland	Dallas	Saturn Chem. Corp.
Houston	Houston	Adair Equipment, Inc.
Houston	Houston	Classic Creations
Houston	Houston	Hunter Indust. Chem.
Houston	Houston	IMCO Chem. Products
Houston	Houston	Industrial Chem.
Houston	Houston	James Soap & Chem.
Houston	Houston	Palmer House Chem. Corp.
Houston	Houston	Pil-Chem.
Houston	Houston	Texas Disinfectant
Houston	Houston	Tychem, Inc.
Irving	Dallas	Auto Fab Metal Products
Irving	Dallas	Gem Products, Inc.
Lancaster	Dallas	Winzer of Dallas, Inc.
Marlin	--	Heritage, Inc. of Marlin
Odessa	Odessa	Shield, Inc.
Rosser	--	H. W. Tyson Assoc.

State City	SMSA	Company
TEXAS (cont.)		
San Antonio	San Antonio	William H. Beck
San Antonio	San Antonio	Chaffee & Sons
Sulphur Springs	--	Dempco Chemical Mfg.
Victoria	--	Marco Laboratories, Inc.
Wichita Falls	Wichita Falls	Flex-A-Clean
UTAH		
Layton	Salt Lake City	Chem Sol, Inc.
Salt Lake City	Salt Lake City	Thatcher Chem.
Salt Lake City	Salt Lake City	Tri-States Chem.
VIRGINIA		
Franklin	--	Phillips Soap
Great Falls	Washington, D. C.	W. B. Sorrells
Richmond	Richmond	Cavalier Compound
Richmond	Richmond	Nylonu, Inc.
Richmond	Richmond	Quality Products Lab
Troutville	--	Eads Mfg. & Distr. Corp.
Woodstock	--	Shenandoah Chem.
WASHINGTON		
Auburn	Seattle-Everett	Safeway Stores, Inc.
Puyallup	Tacoma	Tarkelp Mfg.
Seattle	Seattle-Everett	Chemithon Corp.
Seattle	Seattle-Everett	Fremont Chem.
Seattle	Seattle-Everett	National Chem. Corp.
Seattle	Seattle-Everett	North Coast Chem.

State City	SMSA	Company
WASHINGTON (cont.)		
Seattle	Seattle-Everett	Verax Chem.
Spokane	Spokane	Western Soap & Sales
Tacoma	Tacoma	McDonough Products
Tacoma	Tacoma	Philadelphia Quartz Cal
Vancouver	Portland	E. H. Anderson
Yakima	--	Universal Enterprises
WEST VIRGINIA		
Charleston	Charleston	J. C. Zobrist
Fairmont	--	Why Worry Washing Fluid
WISCONSIN		
Beloit	--	C-Z Chem., Inc.
Brillion	--	Calumet Chem.
Butler	Milwaukee	Research Chem.
Eau Claire	--	Couderray Products, Inc.
Elkhorn	--	Elkhorn Chem., Inc.
Fredonia	Milwaukee	De Soto Inc.
Fredonia	Milwaukee	Essential Chem. Corp.
Green Bay	Green Bay	Maloney Chem.
Green Bay	Green Bay	Packerland Chem. Corp.
Green Bay	Green Bay	Sanitary Chemical Supply
Luxemburg	--	Bio-Products Corp. Wis.
Merton	Milwaukee	Essential Chem. Corp.
Milwaukee	Milwaukee	Benlo Chem.
Milwaukee	Milwaukee	John Hanser Soap
Milwaukee	Milwaukee	Edward Kalmer

State City	SMSA	Company
WISCONSIN (cont.)		
Milwaukee	Milwaukee	Lavo Corp.
Milwaukee	Milwaukee	Purdy Products, Inc.
Milwaukee	Milwaukee	Research Chem.
Milwaukee	Milwaukee	Ronex Corp.
Milwaukee	Milwaukee	T & B Soap
Milwaukee	Milwaukee	Yadro Chem, Inc.
New Richmond	--	Garvex Mfg.
Oconto Falls	--	Ralph Lemorande
Potter	--	Calumet Chem.
Racine	Racine	Racine Industrial Plant, Inc.
Racine	Racine	Vic Kum Chem.
Racine	Racine	Von Schrader Mfg.
Racine	Racine	Wink Corp.
Sheboygan	--	Rexine Co., Inc.
Thiensville	Milwaukee	Du Mar Chem., Inc.
Two Rivers	--	Harold P. Schultz
Waukesha	Milwaukee	Palmer, Inc.

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* N: no name given when list was compiled.

F.18 Iron and Steel

The 224 blast furnaces for the production of pig iron used in steelmaking are located in 67 plants in 16 States(48,49) (see table F-31). Half of the plants are in Ohio and Pennsylvania. As is shown in figure F-28, each of these two States in 1967 produced a major fraction of the total annual pig iron output of the United States. All but 6 of the 67 plant sites are within SMSA's.

As would be expected, the pattern of steel production by States is similar to that of pig iron. The map, figure F-29, shows 1967 steel production by States, or by groups of States having few producers. Of the 138 plants, 119 (86 percent) are within SMSA's(48,49) (see table F-32).

Air pollutants generated and emitted by the iron and steel industry depend primarily on the type of furnace used in the production process. The major furnace types are blast, open hearth, basic oxygen, electric, and the Bessemer converter which now accounts for only a small percentage of steel production. Iron ore is reduced in the blast furnace to produce pig iron, the basic ingredient for steel; steel is produced in one or more of the other furnace types.

Pollutants from blast furnaces are primarily particulates and gaseous emissions. Gaseous pollutants generated within the furnace include carbon monoxide, small amounts of nitrogen oxides, probably some small amounts of sulfur dioxide, and other common combustion gases; generally, most of the carbon monoxide is either recycled within the furnace ventwork for use as a fuel or burned in waste gas flares. Fluorides, emitted both as gaseous and particulate matter, depend primarily on the fluoride

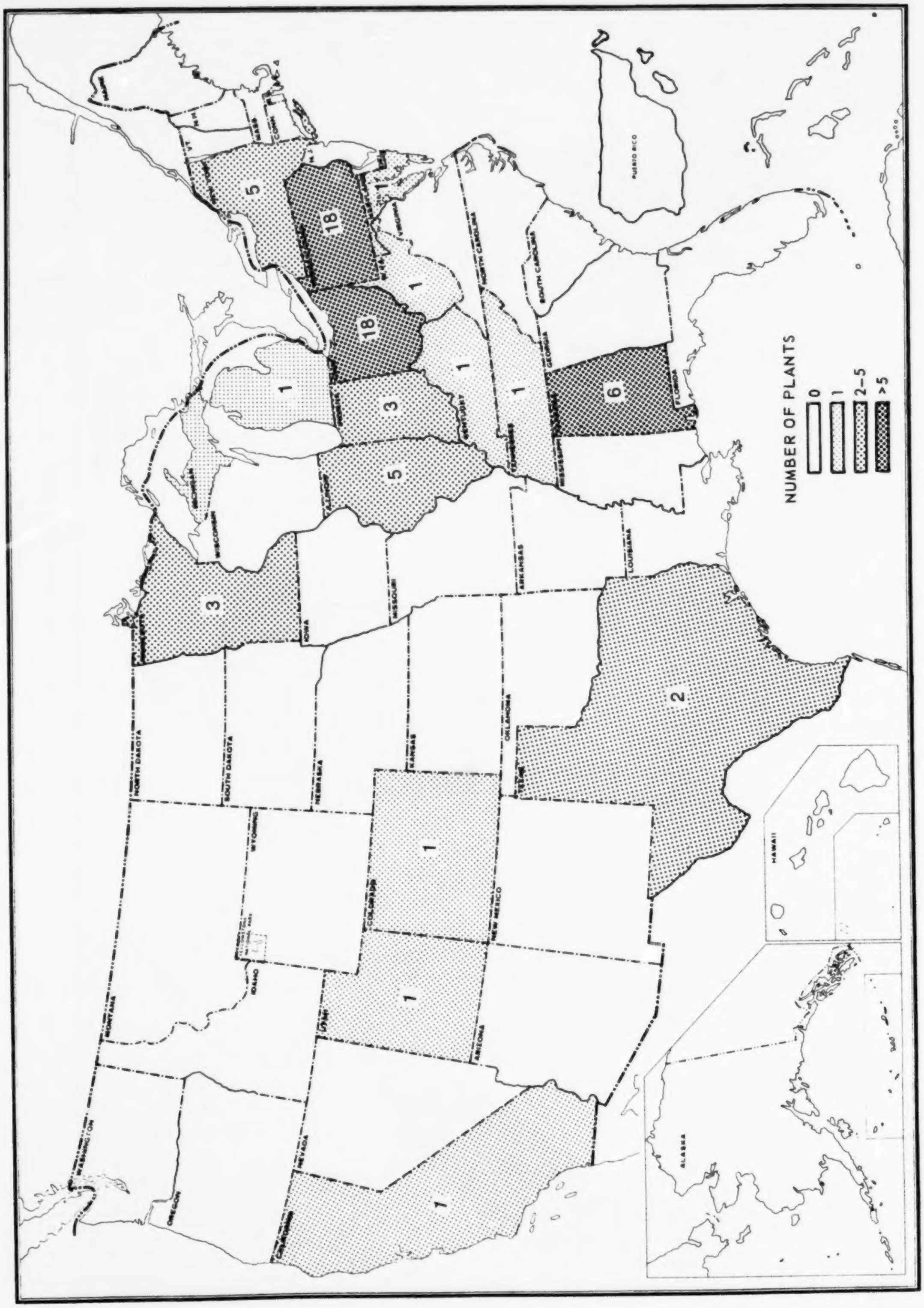
NUMBER OF PLANTS
0
1
2–5
>5
5
18
1
18
1
1
1
3
1
6
5
3
2
1
1
1
PUERTO RICO
HAWAII
ALASKA

Figure F-28. Pig iron plants, 1967.

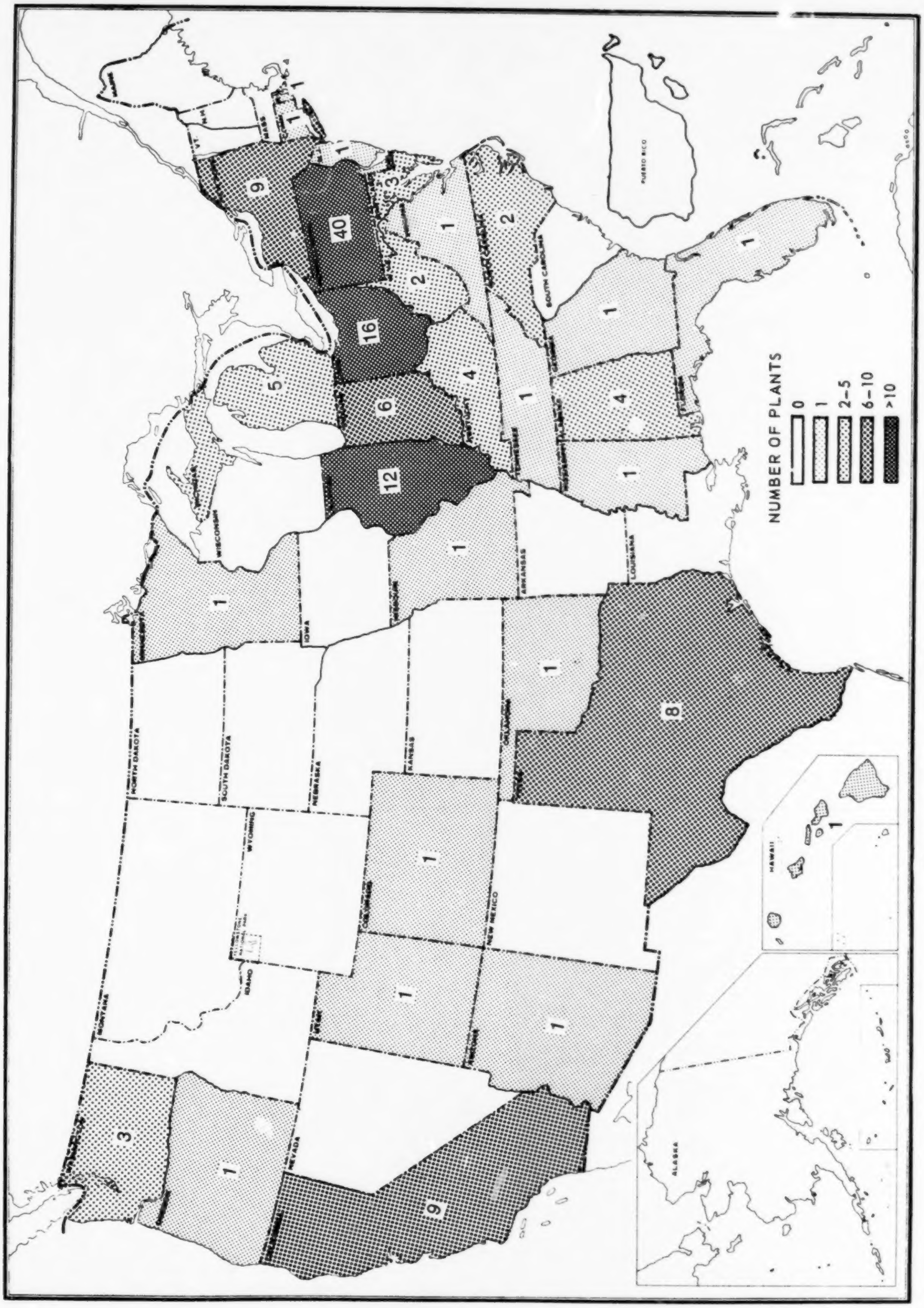
NUMBER OF PLANTS
0
1
2–5
6–10
>10
40
16
12
9
9
8
6
5
4
4
3
3
2
2
1
ALASKA
HAWAII
PUERTO RICO
WISCONSIN
IOWA
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
WYOMING
COLORADO
NEW MEXICO
IDAHO
MONTANA
NEVADA
ARKANSAS
LOUISIANA
SOUTH CAROLINA
VT.
N.H.
MASS.

Figure F-29. Raw steel plants, 1967.

content of the iron ore and on the fluorspar used as a flux to make the slag more fluid.

"Slips" are the principal operating factor which cause particulate pollution. A slip is caused by arching of the furnace charge. When the arch finally breaks and the burden slips into the void, there is a rush of gas to the top of the furnace, which develops abnormally high pressures, much greater than can be handled by the gas-cleaning equipment. When this occurs, bleeders or safety valves open to relieve the pressure and to discharge a dense black or red cloud of dust to the atmosphere. Because slips reduce efficiency and could seriously damage the refractory lining of the furnace, the steel industry has made great strides in reducing the incidence of slips and in investigating their causes.

The actual steel-refining process is the reduction of the impurities in pig iron or steel scrap and the addition of controlled amounts of alloy materials. The most common impurities are carbon, manganese, silicon, sulfur, and phosphorus.

The open-hearth furnace produced approximately 56 percent of the raw steel, basic oxygen furnaces (BOF's) produced approximately 32 percent, and electric furnaces approximately 12 percent of the total production in 1967. The small amount of steel produced by Bessemer furnaces has been included in the open-hearth production.

The open-hearth furnace uses a raw material mixture of scrap iron, steel, and pig iron. The furnace is a basin (hearth) in which oil, coke-oven, or natural gas, tar, or producer gas provides heat. Limestone and other materials are added to control the refining process. The refining operation produces a slag which contains lime combined with the impurities formed or added during the operation.

The rate of pollutant generation depends on furnace size, process methods (i.e., hot, cold, or oxygen-lanced furnace), cycle time, characteristics of the charged material, and type of controls on the furnace. The pollutants emitted are dust, fumes, and gases.

The basic oxygen converter is a cylindrical container open at one end for charging and pouring, and for oxygen injections. The raw materials charge generally consists of scrap iron and steel, and hot molten pig iron. The major pollutants generated are particulates and gases; the oxygen-blowing phase discharges dust and fumes in proportion to the blowing rate.

Electric-arc furnaces, which are in general much smaller than open-hearth furnaces, are used primarily to produce special alloy steels. The furnace is a refractory-lined cylindrical vessel with large carbon electrodes fixed into the roof; as the current arcs between the electrodes, the charge is heated. Pollutants emitted are primarily dust, fumes, and gases (small amounts of nitrogen oxides, sulfur gases, and probably ozone).

Bessemer converter furnaces are not adaptive to air pollution control devices because of the nature of the operation. So far as is known, no control devices are installed on the Bessemer converters currently operating.

Table F-31. BLAST FURNACES
1967

State County	SMSA	Company	Blast Furnaces (Number)	Production of Pig Iron, thousands of tons (1967)
ALABAMA				
Etowah	Gadsden	Republic Steel Corp.	2	
Jefferson	Birmingham	Republic Steel Corp.	2	
Jefferson	Birmingham	U.S. Pipe & Foundry	1	
Jefferson	Birmingham	U.S. Pipe & Foundry	2	
Jefferson	Birmingham	U.S. Steel Corp.	7	
Jefferson	Birmingham	Woodward Iron	4	
(Totals)			(18)	(4,290)
CALIFORNIA				
San Bernardino	San Bernardino-Riverside-Ontario	Kaiser Steel Corp.	4	
COLORADO				
Pueblo	Pueblo	C. F. & I. Steel Corp.	4	
UTAH				
Utah	Provo-Orem	U.S. Steel Corp.	3	
(Totals)			(11)	(4,756)
ILLINOIS				
Cook	Chicago	Interlake Steel Corp.	2	
Cook	Chicago	Interlake Steel Corp.	3	
Cook	Chicago	Republic Steel	1	
Cook	Chicago	U.S. Steel Corp.	11	

State County	SMSA	Company	Blast Furnaces (Number)	Production of Pig Iron, thousands of tons (1967)
ILLINOIS (cont.)				
Madison	St. Louis	Granite City Steel	2	
(Totals)			(19)	(6,309)
INDIANA				
Lake	Gary-Hammond-East Chicago	Inland Steel	8	
Lake	Gary-Hammond-East Chicago	U.S. Steel Corp.	11	
Lake	Gary-Hammond-East Chicago	Youngstown Steel & Tube	3	
(Totals)			(22)	(12,167)
KENTUCKY				
Boyd	Huntington-Ashland	Armco Steel Corp.	3	
MARYLAND				
Baltimore	Baltimore	Bethlehem Steel Corp.	10	
TENNESSEE				
Roane	--	Woodward Iron	3	
TEXAS				
Harris	Houston	Armco Steel Corp.	1	
Morris	Houston	Lone Star Steel	1	
W. VIRGINIA				
Hancock	Steubenville-Weirton	National Steel Corp.	4	
(Totals)			(22)	(10,824)
MICHIGAN				
Wayne	Detroit	Ford Motor Co.	3	

State County	SMSA	Company	Blast Furnaces (Number)	Production of Pig Iron, thousands of tons (1967)
MICHIGAN (cont.)				
Wayne	Detroit	McLouth Steel Corp.	2	
Wayne	Detroit	National Steel Corp.	4	
MINNESOTA				
St. Louis	Duluth-Superior	U.S. Steel Corp.	2	
(Totals)			(11)	(7,439)
NEW YORK				
Erie	Buffalo	Bethlehem Steel Corp.	7	
Erie	Buffalo	Hanna Furnace Corp.	4	
Erie	Buffalo	Republic Steel Corp.	2	
Niagara	Buffalo	Tonawanda Iron Div.	1	
Rensselaer	Albany-Schenectady-Troy	Republic Steel Corp.	1	
(Totals)			(15)	(6,172)
OHIO				
Butler	Hamilton-Middletown	Armco Steel Corp.	2	
Butler	Hamilton-Middletown	Armco Steel Corp.	1	
Cuyahoga	Cleveland	Jones & Laughlin Steel	3	
Cuyahoga	Cleveland	Republic Steel Corp.	6	
Cuyahoga	Cleveland	U.S. Steel Corp.	2	
Jackson	Cleveland	Jackson Iron & Steel	1	
Jefferson	Steubenville-Weirton	Wheeling Steel Corp.	5	
Lorain	Lorain-Elyria	U.S. Steel Corp.	5	
Lucas	Toledo	Interlake Steel Corp.	2	
Mahoning	Youngstown-Warren	Republic Steel Corp.	4	

State County	SMSA	Company	Blast Furnaces (Number)	Production of Pig Iron, thousands of tons (1967)
OHIO (cont.)				
Mahoning	Youngstown-Warren	U.S. Steel Corp.	4	
Mahoning	Youngstown-Warren	Youngstown Sheet & Tube	4	
Mahoning	Youngstown-Warren	Youngstown Sheet & Tube	2	
Scioto	Youngstown-Warren	Detroit Steel Corp.	2	
Stark	Canton	Republic Steel Corp.	1	
Stark	Canton	Republic Steel Corp.	1	
Trumbull	Youngstown-Warren	Republic Steel Corp.	1	
Trumbull	Youngstown-Warren	Valley Mould & Iron Corp.	1	
(Totals)			(47)	(14,485)
PENNSYLVANIA				
Allegheny	Pittsburgh	Jones & Laughlin Steel	6	
Allegheny	Pittsburgh	Shenango, Inc.	2	
Allegheny	Pittsburgh	Shenango, Inc.	2	
Allegheny	Pittsburgh	U.S. Steel Corp.	1	
Allegheny	Pittsburgh	U.S. Steel Corp.	5	
Allegheny	Pittsburgh	U.S. Steel Corp.	6	
Allegheny	Pittsburgh	U.S. Steel Corp.	5	
Beaver	Pittsburgh	Crucible Steel of America	3	
Beaver	Pittsburgh	Jones & Laughlin Steel	5	
Bucks	Philadelphia	U.S. Steel Corp.	3	
Cambria	Johnstown	Bethlehem Steel Corp.	4	
Erie	Erie	Interlake Steel Corp.	1	
Lawrence	Erie	U.S. Steel Corp.	4	

State County	SMSA	Company	Blast Furnaces (Number)	Production of Pig Iron thousands of tons (1967)
PENNSYLVANIA (cont.)				
Lebanon	Erie	E.J. Lavino & Co.		
Mercer	Erie	Sharon Steel Corp.	2	
Montgomery	Philadelphia	Allan Wood Steel	2	
Northampton	Allentown-Bethlehem-Easton	Bethlehem Steel Corp.	5	
Westmoreland	Pittsburgh	Pittsburgh Steel Co.	3	
(Totals)			(59)	(20,542)

TABLE F-32. STEEL PRODUCING FURNACES
1967

State County	SMSA	Company	No. of Furnaces by type Open Hearth	 Basic Oxygen	 Electric	Production, thousands of tons (1967)
ALABAMA						
Etowah	Gadsden	Republic Steel Corp.	-	2	2	
Jefferson	Birmingham	H. K. Porter, Inc.	-	-	3	
Jefferson	Birmingham	Southern Elec. Steel	-	-	2	
Jefferson	Birmingham	U.S. Steel Corp.	24*	-	-	
MISSISSIPPI						
Jackson	--	Mississippi Steel Corp.	-	-	2	
TENNESSEE						
Knox	Knoxville	Knoxville Iron	-	-	3	
(Totals)			(24)	(2)	(12)	(4,444)
ARIZONA						
Maricopa	Phoenix	Allison Steel Manf.	-	-	2	
COLORADO						
Pueblo	Pueblo	C. F. & I Steel Corp.	10	2	-	
HAWAII						
Honolulu	Honolulu	Hawaiian Western Steel	-	-	1	
OREGON						
Multnomah	Portland	Oregon Steel Mills	-	-	3	
UTAH						
Utah	Provo-Orem	U.S. Steel Corp.	10	-	-	

State County	SMSA	Company	No. of Furnaces by type Open Hearth	Basic Oxygen	Electric	Production, thousands of tons (1967)
WASHINGTON						
King	Seattle-Everett	Bethlehem Steel	-	-	2	
King	Seattle-Everett	Earle M. Jorgensen	-	-	2	
King	Seattle-Everett	Northwest Steel Rolling Mills, Inc.	-	-	2	
(Totals)			(20)	(2)	(12)	(4,154)
CALIFORNIA						
Alameda	San Francisco-Oakland	Judson Steel Corp.	3	-	-	
Alameda	San Francisco-Oakland	Pacific States Steel	4	-	-	
Los Angeles	Los Angeles-Long Beach	Armco Steel Corp.	-	-	3	
Los Angeles	Los Angeles-Long Beach	Bethlehem Steel Corp.	-	-	3	
Los Angeles	Los Angeles-Long Beach	Southwest Steel	-	-	2	
Los Angeles	Los Angeles-Long Beach	U.S. Steel Corp.	4	-	-	
San Bernardino	San Bernardino-Riverside-Ontario	Etiwanda Steel Prod.	-	-	2	
San Bernardino	San Bernardino-Riverside-Ontario	Kaiser Steel Corp.	9	3	-	
San Mateo	San Francisco-Oakland	C. F. & I. Steel Corp.	-	-	3	
(Totals)			(20)	(3)	(13)	(4,100)
CONNECTICUT						
Fairfield	Bridgeport-Stamford-Norwalk	Carpenter Steel	-	-	2	
DELAWARE						
New Castle	Wilmington	Phoenix Steel Corp.	7	-	-	

State County	SMSA	Company	No. of Furnaces by type Open Hearth	 Basic Oxygen	 Electric	Production, thousands of tons (1967)
MARYLAND						
Baltimore	Baltimore	Armco Steel Corp.	-	-	7	
Baltimore	Baltimore	Bethlehem Steel Corp.	19	2	-	
Baltimore	Baltimore	Eastern Stainless Steel	-	-	7	
NEW JERSEY						
Essex	Newark	Wilbur B. Driver	-	-	5	
RHODE ISLAND						
Providence	Providence-Pawtucket-Warwick	Sashburn Wire	4	-	-	
(Totals)			(30)	(2)	(21)	(8,132)
FLORIDA						
Hillsborough	Tampa-St. Petersburg	Florida Steel Corp.	-	-	3	
GEORGIA						
Fulton	Atlanta	Atlantic Steel	-	-	2	
NORTH CAROLINA						
Mecklenburg	Charlotte	Florida Steel Corp.	-	-	2	
Union	Charlotte	VASCO Metals Corp.	-	-	7	
VIRGINIA						
Roanoke	Roanoke	Roanoke Elec. Steel	-	-	3	
W. VIRGINIA						
Cabell	Huntington-Ashland	H. K. Porter	-	-	2	
Hancock	Steubenville-Weirton	National Steel Corp.	11	-	-	
(Totals)			(11)	(0)	(19)	(4,268)

State County	SMSA	Company	No. of Furnaces by type			Production, thousands of tons (1967)
			Open Hearth	Basic Oxygen	Electric	
ILLINOIS						
Cook	Chicago	Borg-Warner Corp.	-	-	2	
Cook	Chicago	Ceco Corp.	-	-	3	
Cook	Chicago	Columbia Tool Steel	-	-	2	
Cook	Chicago	H. Finkle & Sons	-	-	2	
Cook	Chicago	Interlake Steel Corp.	-	2	-	
Cook	Chicago	International Harvester	-	2	-	
Cook	Chicago	Republic Steel	4	-	8	
Cook	Chicago	U.S. Steel Corp.	20*	-	3	
Madison	St. Louis	Granite City Steel	7	-	-	
Madison	St. Louis	Laclede Steel	-	-	2	
Peoria	Peoria	Keystone Steel & Wire	5	-	-	
Whiteside	Peoria	Northwestern Steel & Wire	-	-	5	
(Totals)			(36)	(4)	(27)	(10,649)
INDIANA						
Allen	Fort Wayne	Joslyn Stainless Steels	-	-	3	
Henry	--	Borg-Warner Corp.	-	-	4	
Howard	--	Continental Steel Corp.	5	-	-	
Lake	Gary-Hammond-East Chicago	Inland Steel	31	2	-	
Lake	Gary-Hammond-East Chicago	U.S. Steel Corp.	38	3	-	
Lake	Gary-Hammond-East Chicago	Youngstown Steel & Tube	17	-	-	
(Totals)			(91)	(5)	(7)	(17,610)
KENTUCKY						
Boyd	Huntington-Ashland	Armco Steel Corp.	8	2	-	

State County	SMSA	Company	No. of Furnaces by type Open Hearth	 Basic Oxygen	 Electric	Production, thousands of tons (1967)
KENTUCKY (cont.)						
Boyd	Huntington-Ashland	Kentucky Elec. Steel	-	-	1	
Campbell	Cincinnati	Interlake Steel Corp.	7	-	3	
Daviess	--	Jessup Steel	-	-	2	
(Totals)			(15)	(2)	(6)	(2,410)
MICHIGAN						
Macomb	Detroit	Jones & Laughlin Steel	-	-	6	
Oakland	Detroit	Allegheny Ludlum Steel	-	-	8	
Wayne	Detroit	Ford Motor	-	2	-	
Wayne	Detroit	McLouth Steel Corp.	-	6	2	
Wayne	Detroit	National Steel Corp.	12	2	-	
(Totals)			(12)	(10)	(16)	(9,245)
MINNESOTA						
St. Louis	Duluth-Superior	U.S. Steel Corp.	9	-	-	
MISSOURI						
Jackson	Kansas City	Armco Steel Corp.	-	-	3	
OKLAHOMA						
Tulsa	Tulsa	Armco Steel Corp.	-	-	1	
TEXAS						
El Paso	El Paso	Border Steel Rolling Mills, Inc.	-	-	2	
Gray	--	Cabot Corp.	-	-	1	
Gregg	--	R. G. LeTourneau, Inc.	-	-	3	
Guadalupe	San Antonio	Structural Metals, Inc.	-	-	2	

State County	SMSA	Company	No. of Furnaces by type Open Hearth	 Basic Oxygen	 Electric	Production, thousands of tons (1967)
TEXAS (cont.)						
Harris	Houston	Armco Steel Corp.	8	-	4	
Harris	Houston	Cameron Iron Works	-	-	19	
Morris	--	Lone Star	5	-	-	
Tarrant	Fort Worth	Texas Steel	-	-	4	
(Totals)			(22)	(0)	(39)	(4,644)
NEW YORK						
Albany & Chautauqua	Albany-Schenectady-Troy	Allegheny Ludlum Steel	-	-	12	
Chautauqua	Albany-Schenectady-Troy	Roblin Steel Corp.	-	-	3	
Cortland	--	Wickwire Brothers	-	-	2	
Erie	Buffalo	Bethlehem Steel Corp.	19	3	-	
Erie	Buffalo	Republic Steel Corp.	9	-	-	
Niagara	Buffalo	Simonds Steel Div.	-	-	5	
Oneida	Utica-Rome	Allegheny Ludlum Steel	-	-	9	
Onondaga	Syracuse	Crucible Steel of America	-	-	10	
(Totals)			(28)	(3)	(41)	(7,298)
OHIO						
Butler	Hamilton-Middletown	Armco Steel Corp.	12	-	-	
Cuyahoga	Cleveland	Jones & Laughlin Steel	-	2	2	
Cuyahoga	Cleveland	Republic Steel Corp	6	2	-	
Hamilton	Cincinnati	American Compressed Steel Corp.	-	-	1	
Jefferson	Steubenville-Weirton	Wheeling Steel Corp.	11	2	-	
Lorain	Lorain-Elyria	U.S. Steel Corp.	15*	-	-	

State County	SMSA	Company	No. of Furnaces by type			Production, thousands of tons (1967)
			Open Hearth	Basic Oxygen	Electric	
OHIO (cont.)						
Mahoning	Youngstown-Warren	Republic Steel Corp.	10	-	-	
Mahoning & Trumbul	Youngstown-Warren	U.S. Steel Corp.	15	-	-	
Mahoning	Youngstown-Warren	Youngstown Sheet & Tube	12	-	-	
Mahoning	Youngstown-Warren	Youngstown Sheet & Tube	11	-	-	
Richland	--	Cyclops Corp.	6	-	2	
Scioto	--	Detroit Steel Corp.	5	-	-	
Stark	Canton	Republic Steel Corp.	6	-	10	
Stark	Canton	Timken Roller Bearing	-	-	9	
Trumbull	Youngstown-Warren	Copperweld Steel	-	-	8	
Trumbull	Youngstown-Warren	Republic Steel Corp.	-	2	2	
(Totals)			(109)	(8)	(34)	(20,378)
PENNSYLVANIA						
Allegheny	Pittsburgh	Allegheny Ludlum Steel	-	2	12	
Allegheny	Pittsburgh	Cyclops Corp.	-	-	10	
Allegheny	Pittsburgh	Edgewater Steel	-	-	1	
Allegheny	Pittsburgh	Firth Sterling, Inc.	-	-	7	
Allegheny	Pittsburgh	Heppenstall	2	-	-	
Allegheny	Pittsburgh	Jones & Laughlin Steel	12	-	1	
Allegheny	Pittsburgh	Mesta Machine	4	-	1	
Allegheny & Washington	Pittsburgh	Union Elec. Steel Corp.	-	-	1	
Allegheny	Pittsburgh	U.S. Steel Corp.	-	2	5	
Allegheny	Pittsburgh	U.S. Steel Corp.	16	-	-	
Allegheny	Pittsburgh	U.S. Steel Corp.	25	-	-	

State County	SMSA	Company	No. of Furnaces by type Open Hearth	Basic Oxygen	Electric	Production, thousands of tons (1967)
PENNSYLVANIA (cont.)						
Beaver	Pittsburgh	Babcock & Wilcox	-	-	7	
Beaver	Pittsburgh	Crucible Steel of America	6	-	16	
Beaver	Pittsburgh	Jones & Laughlin Steel	8*	2	-	
Beaver	Pittsburgh	Vasco Metals Corp.	-	-	1	
Berks	Reading	Carpenter Steel	-	-	8	
Bucks	Philadelphia	U.S. Steel Corp.	9	-	-	
Butler	--	Armco Steel Corp.	6	-	1	
Cambria	Johnstown	Bethlehem Steel Corp.	15	-	-	
Chester	Philadelphia	Luken Steel	6	-	3	
Chester	Philadelphia	Phoenix Steel Corp.	5	-	-	
Dauphin	Harrisburg	Bethlehem Steel Corp.	10	-	2	
Dauphin	Harrisburg	Harrisburg Steel	3	-	-	
Erie	Erie	Erie Forge & Steel Corp.	-	-	2	
Lawrence	--	Mesta Machine	4	-	-	
Lawrence	--	U.S. Steel Corp.	6*	-	-	
Mercer	--	Sharon Steel Corp.	11	2	2	
Mifflin	--	Baldwin-Lima-Hamilton	2	-	5	
Montgomery	Philadelphia	Alan Wood Steel	9	-	-	
Northampton	Allentown-Bethlehem-Easton	Bethlehem Steel Corp.	19	-	6	
Northumberland	--	Ceco Corp.	-	-	3	
Philadelphia	Philadelphia	Midvale-Heppenstall	-	-	6	
Warren	--	National Forge	-	-	3	
Washington	Pittsburgh	Jessop Steel	-	-	6	
Washington	Pittsburgh	Washington Steel Corp.	-	-	2	

State County	SMSA	Company	No. of Furnaces by type Open Hearth	 Basic Oxygen	 Electric	Production, thousands of tons (1967)
PENNSYLVANIA (cont.)						
Westmoreland	Pittsburgh	Alco Products, Inc.	2	-	-	
Westmoreland	Pittsburgh	Braeburn Alloy Steel Div.	-	-	3	
Westmoreland	Pittsburgh	Pittsburgh Steel	12	2	-	
Westmoreland	Pittsburgh	Vacso Metals Corp.	-	-	11	
(Totals)			(192)	(10)	(125)	(29,881)

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* Includes 3 Bessemer converters.

F.19 Sulfuric Acid

More sulfuric acid is produced in the United States than any other chemical. Because the chamber process for the production of sulfuric acid has been displaced by the contact process, about 97 percent of current output is from contact plants. Elemental sulfur accounts for about 75 percent of all raw materials consumed in sulfuric acid production. Most of the remaining new acid comes from pyrites or other iron sulfides, smelter gas, hydrogen sulfide, crude sulfur, and copper, zinc, and lead ores. Increasing amounts of used sulfuric acid are recovered for reuse in reprocessing because of disposal difficulties; primary sources are petroleum refining, alcohols manufacture, nitric acid and chlorine drying, explosives production, and detergent and other sulfonations.

In 1967, there were 213 sulfuric acid plants in 42 States; Florida, Illinois, Georgia, Texas, California, Ohio, New Jersey, and Virginia accounted for 50 percent of the plant sites(50) (see table F-33). The map shown in figure F-30 depicts the geographical distribution; 62 percent of the plants are within SMSA's. Individual plant capacities range from about 10 tons to nearly 5,000 tons per day of 100 percent acid. Total acid output for 1967 was 27,735,504 tons.(51)

In the contact process, elemental sulfur-bearing materials are first burned in clean dry air; then the resultant sulfur dioxide is further oxidized in the presence of a catalyst to sulfur trioxide, which is cooled and absorbed in a circulating stream of 98 to 99 percent sulfuric acid. Unabsorbed sulfur dioxide and sulfur trioxide aerosols pass to the atmosphere.

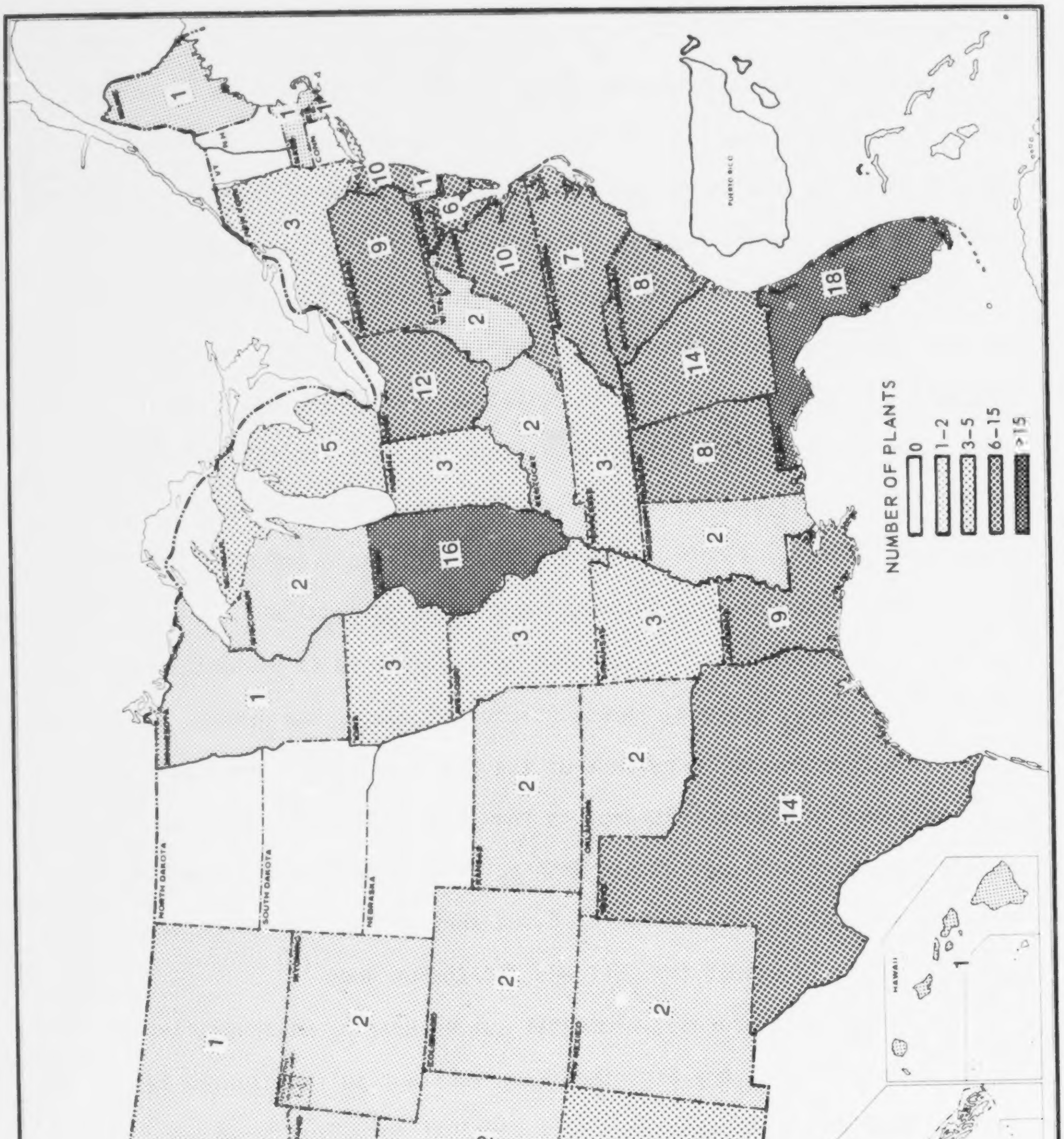
NUMBER OF PLANTS
0
1–2
3–5
6–15
>15
ALASKA
HAWAII
PUERTO RICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
OREGON

Figure F-30. Sulfuric acid plants, 1967.

The principal emissions are sulfuric acid aerosols (sulfur trioxide reacting with atmospheric moisture) and sulfur dioxide. The sulfur dioxide emission results from the incomplete conversion of sulfur dioxide to sulfur trioxide in the catalyst converter; these emissions range from about 20 to 70 pounds per ton of acid produced. Control methods are scrubbing and absorption. Acid aerosol emissions range from approximately 0.3 to 7.5 pounds per ton of acid produced. Control devices include mist eliminators, electrostatic precipitators, and venturi scrubbers.

The double-contact process for sulfuric acid production is expected to be introduced in the United States in 1970. With this process, the sulfur dioxide emissions are reduced from about 2,000 ppm to about 500 ppm. The same type of control for acid aerosol will still be required.

Table F-33. SULFURIC ACID PLANTS
December 1967

State City	SMSA	Company	Capacity, tons per year 100% H_2SO_4
ALABAMA			
Birmingham	Birmingham	Mobil Chemical Co.	27,000
Childersburg	--	Cities Service Co., Inc.	(150,000)*
Dothan	--	Home Guano Co.	(13,500)
Dothan	--	Mobil Chemical Co.	29,000
LeMoyne	Mobile	Stauffer Chemical Co.	210,000
Mineral Springs	--	E.I. duPont de Nemours & Co., Inc.	(23,000)
Mobile	Mobile	American Cyanamid Company	28,000
Tuscaloosa	Tuscaloosa	Reichhold Chemicals, Inc.	(71,500)
ARIZONA			
Bagdad	--	Bagdad Copper Corp.	72,000
Chandler	Phoenix	Arizona Agrochemical Corp.	28,000
Morenci	--	Phelps Dodge Corp.	270,000
Ray	--	Kennecott Copper Corp.	250,000
ARKANSAS			
El Dorado	--	Monsanto Co.	132,000
Helena	--	Arkla Chemical Corp.	210,000
N. Little Rock	Little Rock-N. Little Rock	Olin	100,000

State City	SMSA	Company	Capacity, tons per year 100% H_2SO_4
CALIFORNIA			
Avon	San Francisco-Oakland	Monsanto Co.	132,000
Bena Edison	Bakersfield	A F C, Inc.	67,500
Dominguez	Los Angeles-Long Beach	Stauffer Chemical Co.	325,000
El Segundo	Los Angeles-Long Beach	Allied Chemical Corp.	180,000
Helm	Fresno	Valley Nitrogen Producers, Inc.	360,000
Lathrop	Stockton	Occidental Petroleum Corp.	200,000
Los Angeles	Los Angeles-Long Beach	Union Oil Co. of California, Collier Carbon and Chemical Corp.	140,000
Nichols (Bay Point)	San Francisco-Oakland	Allied Chemical Corp.	140,000
Richmond	San Francisco-Oakland	Allied Chemical Corp.	220,000
Richmond	San Francisco-Oakland	Stauffer Chemical Co.	175,000
Selby	San Francisco-Oakland	American Smelting & Refining Co.	(15,000)
Vernon	Los Angeles-Long Beach	Stauffer Chemical Co.	120,000
COLORADO			
Denver	Denver	Allied Chemical Corp.	50,000
Uravan	--	Union Carbide Corp.	(55,000)
DELAWARE			
North Claymont	Wilmington	Allied Chemical Corp.	350,000
FLORIDA			
Agricola	--	Swift & Co.	(300,000)
Bartow	--	W.R. Grace & Co.	(800,000)
Bartow	--	USS Agri-Chemicals, Inc., Div. U.S. Steel Corp.	288,000

State City	SMSA	Company	Capacity, tons per year 100% H_2SO_4
FLORIDA (cont.)			
Bartow	--	Chemicals, Inc.	1,225,000
Bartow (Mulberry)	--	International Minerals & Chemical Corp.	(450,000)
Bradenton (Piney Point)	--	Borden Chemical Co., Smith-Douglass Div.	490,000
Brewster	--	American Cyanamid Co.	525,000
Cottondale	--	Wilson & Toomer Fertilizer Co.	15,000
Fort Meade	--	USS Agri-Chemicals, Inc., Div. U.S. Steel Corp.	540,000
Green Bay (Pierce)	--	Farmland Industries, Inc.	550,000
Jacksonville	Jacksonville	Wilson & Toomer Fertilizer Co.	40,000
Mulberry	--	F.S. Royster Guano Co.	(350,000)
Nichols	--	Mobil Chemical Co.	(500,000)
Pensacola	Pensacola	Continental Oil Co., Agrico Chem. Co. Div.	29,500
Pierce	--	Continental Oil Co., Agrico Chem. Co. Div.	700,000
Plant City	Tampa-St. Petersburg	Central Phosphates, Inc.	550,000
Tampa	Tampa-St. Petersburg	Cities Service Co., Inc.	(1,500,000)
White Springs	Fort Lauderdale-Hollywood	Occidental Petroleum Corp.	700,000
GEORGIA			
Albany	Albany	USS Agri-Chemicals, Inc., Div. U.S. Steel Corp.	25,000
Athens	--	F.S. Royster Guano Co.	(30,000)
Attapulgus	--	Minerals & Chemicals Phillipp Corp.	36,000
Augusta	--	Cities Service Co., Inc., Tennessee Corp.	(110,000)

State City	SMSA	Company	Capacity, tons per year 100% H_2SO_4
GEORGIA (cont.)			
Columbus	Columbus	USS Agri-Chemicals, Inc., Div. U.S. Steel Corp.	16,000
Macon	Macon	Cotton States Fertilizer Co.	(16,000)
Moultrie	--	Columbia Nitrogen Corp.	20,600
Pelham	--	Pelham Phosphate Co.	19,500
Savannah	Savannah	American Cyanamid Co.	225,000
Savannah	Savannah	Continental Oil Co., Agrico Chem. Co. Div.	25,000
Savannah	Savannah	Kaiser Agricultural Chemical Co.	34,000
Savannah	Savannah	Mobil Chemical Co.	21,000
Savannah	Savannah	Southern States Phosphate & Fertilizer Co.	(32,000)
Valdosta	--	Georgia Fertilizer Co.	(20,000)
HAWAII			
Honolulu	Honolulu	Standard Oil Co. of California	33,000
IDAHO			
Kellogg	--	Bunker Hill Co.	140,000
Pocatello	--	J.R. Simplot Co.	800,000
ILLINOIS			
Calumet City	St. Louis	Swift & Co.	(48,000)
Chicago	Chicago	Allied Chemical Corp.	160,000
Chicago Heights	Chicago	USS Agri-Chemicals, Inc., Div. U.S. Steel Corp.	32,000

State City	SMSA	Company	Capacity, tons per year 100% H_2SO_4
ILLINOIS (cont.)			
Depue	--	New Jersey Zinc Co.	360,000+
East St. Louis	St. Louis	Allied Chemical Corp.	190,000
East St. Louis	St. Louis	American Zinc Co.	146,000
East St. Louis	St. Louis	Charles Pfizer & Co., Inc.	5,000
Fulton	--	Continental Oil Co., Agrico Chem. Co. Div.	21,500
Elwood	Chicago	Wilson & Co., Inc. (Joliet Arsenal)	323,000
Joliet	Chicago	American Cyanamid Co.	50,000
Joliet	Chicago	Olin	401,000
LaSalle	--	Matthieson & Hegeler Zinc Co.	(42,000)
Marseilles	--	Hooker Chemical Corp.	255,000
Monsanto	St. Louis	Monsanto Co.	249,000
Streator	--	Borden Chemical Co., Smith-Douglass Div.	41,000
Tuscola	--	National Distillers & Chemical Corp., U.S. Industrial Chemicals Co.	150,000
INDIANA			
East Chicago	Gary-Hammond-East Chicago	E.I. du Pont de Nemours & Co., Inc.	(410,000)
Hammond	Gary-Hammond-East Chicago	Stauffer Chemical Co.	275,000
Indianapolis	Indianapolis	Marion Mfg. Co.	62,400

State City	SMSA	Company	Capacity, tons per year 100% H_2SO_4
IOWA			
Dubuque	Dubuque	National Distillers and Chemical Corp., U.S. Industrial Chemicals Co.	70,000
Humboldt	--	Continental Oil Co., Agrico Chem. Co. Div.	20,000
Mason City	--	International Minerals & Chemical Corp.	(30,000)
KANSAS			
De Soto (Sunflower)	Kansas City	National Distillers & Chemical Corp., U.S. Industrial Chemicals Co.	70,000
Galena	--	The Eagle-Picher Co.	150,000
KENTUCKY			
Calvert City	--	Pennsalt Chemical Corp.	47,000
Wurtland	--	E.I. du Pont de Nemours & Co., Inc.	(200,000)
LOUISIANA			
Baton Rouge	Baton Rouge	Allied Chemical Corp.	100,000
Baton Rouge	Baton Rouge	Stauffer Chemical Co.	450,000
Bossier City	Shreveport	Olin	70,000
Burnside	--	E.I. du Pont de Nemours & Co., Inc.	510,000
Convent	--	Freeport Sulphur Co.	1,700,000
Fortier	New Orleans	American Cyanamid Co.	53,000

State City	SMSA	Company	Capacity, tons per year 100% H_2SO_4
LOUISIANA (cont.)			
Geismar	--	Allied Chemical Corp.	500,000
Lake Charles	Lake Charles	Cities Service Co, Inc.	149,000
Taft	--	Hooker Chemical Corp.	510,000
MAINE			
Searsport	--	W.R. Grace & Co.	(75,000)
MARYLAND			
Baltimore	Baltimore	Continental Oil Co., Agrico Chem. Co. Div.	24,000
Baltimore	Baltimore	Kerr-McGee Chemical Corp.	110,000
Baltimore	Baltimore	W.R. Grace & Co.	(300,000)
Baltimore	Baltimore	Olin	330,000
Baltimore	Baltimore	F.S. Royster Guano Co.	(40,000)
Sparrows Pt.	Baltimore	Bethlehem Steel Corp.	86,000
MASSACHUSETTS			
Everett	--	Monsanto Co.	120,000
MICHIGAN			
Bay City	Bay City	Continental Oil Co., Agrico Chem. Co. Div.	37,000
Detroit	Detroit	Allied Chemical Corp.	200,000
Detroit	Detroit	W.R. Grace & Co.	(36,000)
Ecorse	Detroit	E.I. du Pont de Nemours & Co., Inc.	(175,000)
Kalamazoo	Kalamazoo	American Cyanamid Co.	25,000

State City	SMSA	Company	Capacity, tons per year 100% H_2SO_4
MINNESOTA			
Pine Bend	Minneapolis-St. Paul	North Star Chemicals, Inc.	120,000
MISSISSIPPI			
Pascagoula	--	Coastal Chemical Corp.	320,000
Tupelo	--	International Minerals & Chemical Corp.	(18,000)
MISSOURI			
Joplin	--	W.R. Grace & Co.	(70,000)
St. Louis	St. Louis	National Lead Co., Titanium Pigment Corp.	500,000
Salem (Buick)	--	Missouri Lead Smelting Co. (American Metal Climax Co.)	(70,000)
MONTANA			
Anaconda	--	Anaconda Co.	146,000
NEVADA			
Yerington	--	Anaconda Co.	140,000
NEW JERSEY			
Bound Brook	--	American Cyanamid Co.	64,000
Deepwater	Wilmington	E.I. du Pont de Nemours & Co., Inc.	(125,000)
Edison	--	L.J. and M. La Place Co.	(70,000)
Elizabeth	Newark	Allied Chemical Corp.	200,000
Gibbstown	Philadelphia	E.I. du Pont de Nemours & Co., Inc.	(108,000)
Linden	Newark	E.I. du Pont de Nemours & Co., Inc.	(325,000)

State City	SMSA	Company	Capacity, tons per year 100% H_2SO_4
NEW JERSEY (cont.)			
Newark	Newark	Essex Chemical Corp.	18,000
Paulsboro	Philadelphia	Olin	300,000
Sayreville	--	National Lead Co., Titanium Pigment Corp.	600,000
Warners	Newark	American Cyanamid Co.	197,000
NEW MEXICO			
Grants	--	Kerr-McGee Chemical Corp.	140,000
Hobbs	--	Climax Chemical Co.	75,000
NEW YORK			
Buffalo	Buffalo	Allied Chemical Corp.	195,000
Buffalo	Buffalo	Continental Oil Co., Agrico Chem. Co. Div.	33,000
Rochester	Rochester	Eastman Kodak Co.	3,500
NORTH CAROLINA			
Acme	--	Acme Chemical, Inc.	57,000
Greensboro	Greensboro-Winston Salem-High Point	Continental Oil Co., Agrico Chem. Co. Div.	22,500
Lee Creek (Aurora)	--	Texas Gulf Sulphur Co.	1,067,500
Selma	--	Mobil Chemical Co.	11,000
Wilmington	Wilmington	USS Agri-Chemicals, Inc., Div. U.S. Steel Corp.	94,000
Wilmington	Wilmington	Mobil Chemical Co.	36,000
Wilmington	Wilmington	Swift & Co.	(50,000)

STATE City	SMSA	Company	Capacity, tons per year 100% H_2SO_4
OHIO			
Cairo	Lima	Continental Oil Co., Agrico Chem. Co., Div.	43,500
Cincinnati	Cincinnati	Mobile Chemical Co.	25,000
Cleveland	Cleveland	Allied Chemical Corp.	130,000
Cleveland	Cleveland	Continental Oil Co., Agrico Chem. Co., Div.	37,000
Cleveland	Cleveland	E.I. du Pont de Nemours & Co., Inc.	(215,000)
Columbus	Columbus	American Zinc Co.	64,000
Copley	Akron	Minnesota Mining & Mfg. Co.	60,000
Hamilton	Hamilton-Middletown	American Cyanamide Co.	90,000
Lockland	Cincinnati	International Minerals & Chemical Corp.	(45,000)
North Bend	Cincinnati	E.I. du Pont de Nemours & Co., Inc.	(175,000)
Sandusky	--	Diamond Fertilizer, Inc.	(11,000)
Toledo	Toledo	F.S. Royster Guano Co.	(20,000)
OKLAHOMA			
Bartlesville	--	National Zinc Co.	(70,000)
Tulsa	Tulsa	Ozark-Mahoning Co.	120,000
PENNSYLVANIA			
Cronwells Hts.	Philadelphia	E.I. du Pont de Nemours & Co., Inc.	(70,000)
Easton	Allentown-Bethlehem-Easton	Charles Pfizer & Co.	10,000 +
Josephtown	Pittsburgh	St. Joseph Lead Co.	(265,000)
Neville Island	Pittsburgh	USS Chemicals, Inc., Div. U.S. Steel Corp.	(47,000)
Newell	--	Allied Chemical Corp.	250,000
Palmerton	--	New Jersey Zinc Co.	160,000
Petrolia	--	Witco Chem. Co., Inc., Sonnebern Div.	45,000
Philadelphia	Philadelphia	Atlantic Richfield Co.	140,000
Philadelphia	Philadelphia	Rohm & Haas Co.	88,000

STATE City	SMSA	Company	Capacity, tons per year 100% H_2SO_4
RHODE ISLAND			
Rumford	Providence-Pawtucket-Warwick	Essex Chemical Corp., Rumford Chem. Works	18,000
SOUTH CAROLINA			
Anderson	--	Anderson Fertilizer Co., Inc.	(17,000)
Charleston	Charleston	Continental Oil Co., Agrico Chem. Co. Div.	32,500
Charleston	Charleston	W.R. Grace & Co.	(40,000)
Charleston	Charleston	Planters Fertilizer & Phosphate Co.	(25,000)
Charleston	Charleston	R.S. Royster Guano Co.	(20,000)
Charleston	Charleston	Mobil Chemical Co.	40,000
Greenville	Greenville	Mobil Chemical Co.	6,000
Spartanburg	--	International Minerals & Chemical Corp.	(20,000)
TENNESSEE			
Copperhill (Isabella)	--	Cities Service Co., Inc.	(950,000)
Memphis	Memphis	Mobile Chemical Co.	12,000
Nashville	Nashville	USS Agri-Chemicals, Inc., Div. U.S. Steel Corp.	61,000
TEXAS			
Baytown	Houston	Stauffer Chemical Co.	275,000
Beaumont	Beaumont-Port Arthur-Orange	Olin	190,000
Corpus Christi	Corpus Christi	American Smelting & Refining Co.	(70,000)
Dumas (Sunray)	--	Shamrock Oil & Gas Corp.	32,000
Fort Worth	Fort Worth	Stauffer Chemical Co.	120,000
Galena Park	Houston	American Plant Food Corp.	125,000
Houston	Houston	Stauffer Chemical Co.	1,400,000
LaPorte	Houston	E.I. du Pont de Nemours & Co., Inc.	(350,000)

STATE City	SMSA	Company	Capacity, tons per year 100% H_2SO_4
TEXAS (contd.)			
Pasadena	Houston	Olin	263,000
Pasadena	Houston	Phosphate Chemicals, Inc.	(420,000)
Plainview	--	Occidental Petroleum Corp.	100,000
Port Arthur	Beaumont-Port Arthur-Orange	Gulf Oil Corp.	140,000
Port Arthur	Beaumont-Port Arthur-Orange	Texaco, Inc.	(95,000)
Texas City	Galveston-Texas City	Borden Chemical Co., Smith-Douglass Div.	155,000
UTAH			
Magna (Garfield)	Salt Lake City	Kennecott Copper Corp.	475,000
Mexican Hat	--	AZ Minerals Corp.	27,600
VIRGINIA			
Buell (Norfolk)	Norfolk-Portsmouth	Swift & Co.	(58,000)
Front Royal	--	Allied Chemical Corp.	160,000
Hopewell	--	Allied Chemical Corp.	200,000
Norfolk	Norfolk-Portsmouth	Borden Chemical Corp.	81,000
Norfolk	Norfolk-Portsmouth	F.S. Royster Guano Co.	20,000
Norfolk	Norfolk-Portsmouth	Weaver Fertilizer Co., Inc.	(50,000)
Norfolk	Norfolk-Portsmouth	W.R. Grace & Co.	22,000
Piney River	--	American Cyanamid Co.	30,000
Richmond	Richmond	E.I. du Pont de Nemours & Co., Inc.	(95,000)
Richmond	Richmond	Mobil Chemical Col.	16,000

STATE City	SMSA	Company	Capacity, tons per year 100% H_2SO_4
WASHINGTON			
Anacortes	--	Allied Chemical Corp.	78,000
Bellingham	--	Georgia-Pacific Corp.	17,000
WEST VIRGINIA			
Nitro	Charleston	Allied Chemical Corp.	140,000
S. Charleston	Charleston	Union Carbide Corp.	18,000
WISCONSIN			
Barksdale	--	E. I. du Pont de Nemours & Co., Inc.	(25,000)
Madison	Madison	F. S. Royster Guano Co.	(20,000)
WYOMING			
Jeffrey City	--	Western Nuclear, Inc.	36,000
Riverton	--	Western Nuclear, Inc.	72,000

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* (   ) = Estimates

F.20 Incineration

Waste disposal is a mounting problem in today's society, and open burning is a recognized pollution source that is being supplanted by other methods of disposal. Land and sea fills and composting are used in some areas, but on a large scale, combustible refuse is disposed of by incineration.

There were 146 municipal incinerators of 200 tons or more capacity per day in 1966(52) (see table F-34); distribution of these municipal incinerators is shown on the map in figure F-31. Geographically, 29 are in New York, 16 in Pennsylvania, and 10 or more each in Connecticut, Florida, Massachusetts, and Ohio; 97 percent of these large units are within SMSA's. There were 254 plants in 1966, of 10 tons and larger capacity operating in 185 towns.

Emissions from the incineration process include particulates, hydrocarbons, carbon monoxide, odors, organic acids, carcinogens, nitrogen oxides, aldehydes, and ketones. Methods of emissions control range from electrostatic precipitators to scrubbers and impact separators. Design of the incinerator plays an important role in promoting good combustion; advanced designs are being studied that will reduce emissions and produce steam or power as a by-product. Careful attention to combustion fundamentals of time, turbulence, temperature, and adequate oxygen supply will reduce emissions. Research studies have shown that particulate emissions from incinerators are primarily dependent on underfire air rate and fuel composition regardless of furnace size.(53)

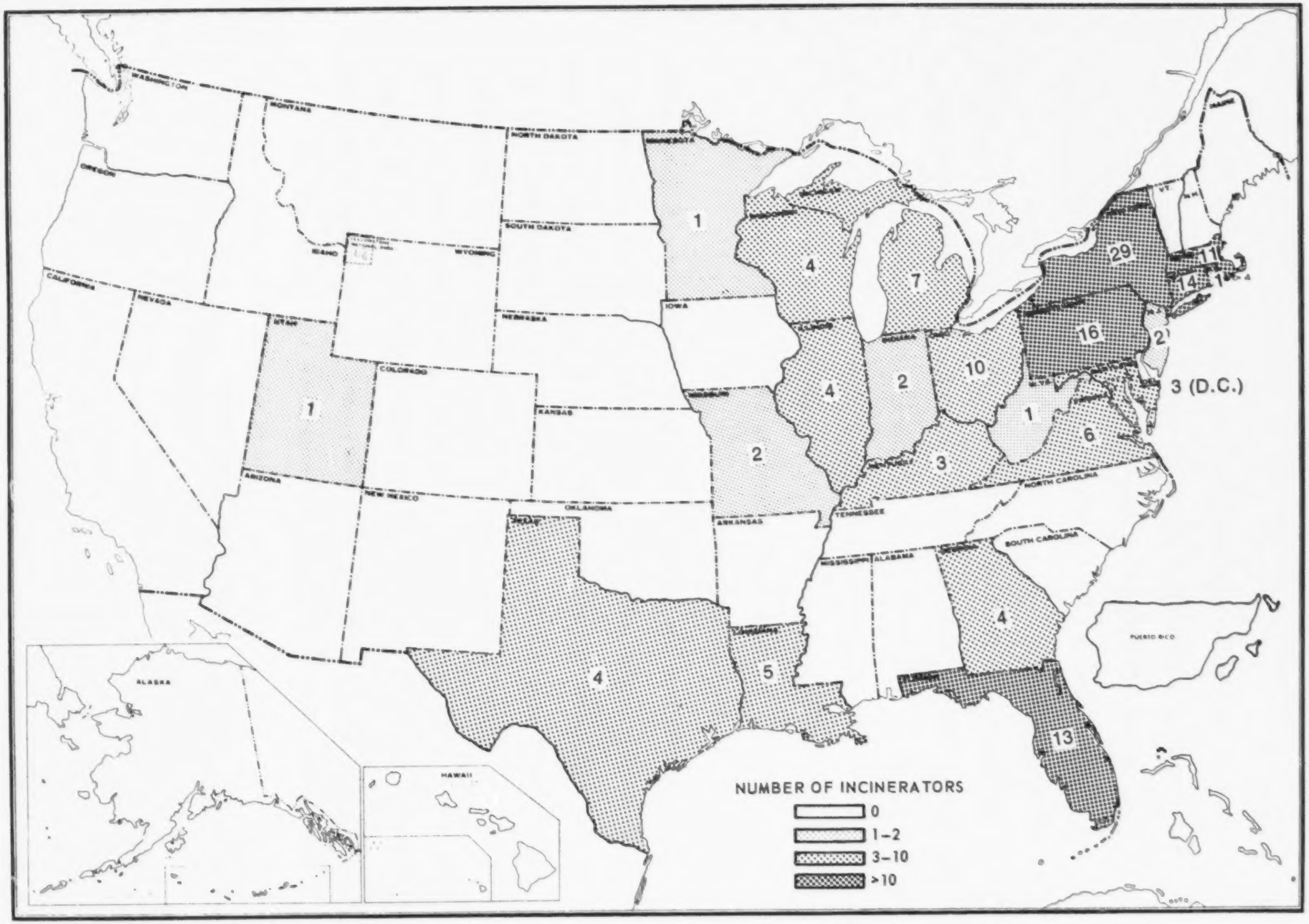
WASHINGTON
OREGON
CALIFORNIA
NEVADA
IDAHO
MONTANA
WYOMING
UTAH
COLORADO
ARIZONA
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
MINNESOTA
IOWA
MISSOURI
ARKANSAS
TENNESSEE
MISSISSIPPI
ALABAMA
NORTH CAROLINA
SOUTH CAROLINA
VT
NH
PUERTO RICO
ALASKA
HAWAII
1
1
4
7
29
11
14
1
4
16
2
3 (D.C.)
4
2
10
2
1
3
6
4
5
4
13
NUMBER OF INCINERATORS
0
1–2
3–10
>10

Figure F-31. Municipal incinerators ($\geq$ 200 tons/day), 1966.

Table F-34. MUNICIPAL INCINERATORS
200 Tons or More Per 24-Hour Day
Operating in 1966

State City	SMSA	Capacity, Tons per Day
CONNECTICUT		
Bridgeport	Bridgeport-Stamford-Norwalk	300
Bridgeport	Bridgeport-Stamford-Norwalk	200
East Hartford	Hartford-New Britain	200
Greenwich	Bridgeport-Stamford-Norwalk	250
Greenwich	Bridgeport-Stamford-Norwalk	200
Hartford	Hartford-New Britain	600
New Britain	Hartford-New Britain	300
New Haven	New Haven	720
Norwalk	Norwalk	360
Stamford	Bridgeport-Stamford-Norwalk	225
Stratford	Bridgeport-Stamford-Norwalk	240
Waterbury	Waterbury	300
West Hartford	Hartford-New Britain	350
West Haven	New Haven	300
DISTRICT OF COLUMBIA		
Washington	Washington, D.C.	500
Washington	Washington, D.C.	500
Washington	Washington, D.C.	500
FLORIDA		
Broward	Fort Lauderdale-Hollywood	600
Clearwater	Tampa-St. Petersburg	300

State City	SMSA	Capacity, Tons per Day
FLORIDA (cont.)		
Coral Gables	Miami	300
Hollywood	Fort Lauderdale-Hollywood	450
Ft. Lauderdale	Fort Lauderdale-Hollywood	450
Ft. Lauderdale	Fort Lauderdale-Hollywood	250
Jacksonville	Jacksonville	350
Jacksonville	Jacksonville	350
Miami	Miami	900
Miami	Miami	300
Orlando	Orlando	250
Orlando	Orlando	200
St. Petersburg	Tampa-St. Petersburg	500
GEORGIA		
Atlanta	Atlanta	330
Atlanta	Atlanta	350
Atlanta	Atlanta	500
DeKalb	Atlanta	600
ILLINOIS		
Chicago	Chicago	720
Chicago	Chicago	1,200
Chicago	Chicago	1,200
Cicero	Chicago	500
INDIANA		
Indianapolis	Indianapolis	450
New Albany	Louisville	285

State City	SMSA	Capacity, Tons per Day
KENTUCKY		
Lexington	Lexington	200
Louisville	Louisville	750
Louisville	Louisville	250
LOUISIANA		
Jefferson Parish	New Orleans	400
New Orleans	New Orleans	200
New Orleans	New Orleans	400
New Orleans	New Orleans	400
Shreveport	Shreveport	350
MARYLAND		
Baltimore	Baltimore	600
Baltimore	Baltimore	800
Montgomery	Washington, D.C.	1,050
MASSACHUSETTS		
Boston	Boston	750
Brookline	Boston	300
Framingham	--	200
Holyoke	Springfield-Chicopee-Holyoke	225
Lawrence	Lawrence-Haverhill	300
Lowell	Lowell	400
New Bedford	New Bedford	240
Salem	Boston	235
Somerville	Boston	300
Weymouth	Boston	300
Worcester	Worcester	250

State City	SMSA	Capacity, Tons per Day
MICHIGAN		
Detroit	Detroit	400
Detroit	Detroit	400
Detroit	Detroit	600
Detroit	Detroit	600
Hamtramck	Detroit	200
Central Wayne County	Detroit	500
S.E. Oakland County	Detroit	600
MINNESOTA		
Minneapolis	Minneapolis-St. Paul	225
MISSOURI		
St. Louis	St. Louis	500
St. Louis	St. Louis	500
NEW JERSEY		
Ewing	Trenton	250
Jersey City	Jersey City	600
NEW YORK		
Babylon	New York	300
Binghamton	Binghamton	300
Buffalo	Buffalo	400
Buffalo	Buffalo	300
East Rochester	Rochester	200
Hempstead	New York	650
Hempstead	New York	700
Long Beach	New York	200

State City	SMSA	Capacity, Tons per Day
NEW YORK (cont.)		
Mount Vernon	New York	600
Newburg	--	240
New Rochelle	New York	250
New York	New York	2,840
New York	New York	1,000
New York	New York	1,000
New York	New York	660
New York	New York	1,000
New York	New York	1,000
New York	New York	1,000
New York	New York	1,000
Niagara Falls	Buffalo	240
Oyster Bay	New York	500
Oyster Bay	New York	500
Plainview	New York	900
Rampo	--	200
Rochester	Rochester	450
Rochester	Rochester	450
Valley Stream	New York	200
White Plains	New York	400
Yonkers	New York	450
OHIO		
Cleveland	Cleveland	900
Cleveland	Cleveland	500
Cincinnati	Cincinnati	500
Cincinnati	Cincinnati	500

State City	SMSA	Capacity, Tons per Day
OHIO (cont.)		
Cincinnati	Cincinnati	400
Dayton	Dayton	200
Euclid	Cleveland	300
Parma	Cleveland	225
Sharonville	Cincinnati	300
Youngstown	Youngstown-Warren	300
PENNSYLVANIA		
Abington	Philadelphia	200+
Bradford	--	200
Delaware	Philadelphia	300+
Delaware	Philadelphia	300+
Delaware	Philadelphia	300+
Erie	Erie	225+
Philadelphia	Philadelphia	600
Philadelphia	Philadelphia	200
Philadelphia	Philadelphia	300
Philadelphia	Philadelphia	300
Philadelphia	Philadelphia	250
Philadelphia	Philadelphia	300
Philadelphia	Philadelphia	600
Philadelphia	Philadelphia	600
Pittsburgh	Pittsburgh	400
Whitemarsh	Philadelphia	300
RHODE ISLAND		
Pawtucket	Providence-Pawtucket-Warwick	400

State City	SMSA	Capacity, Tons per Day
TEXAS		
Amarillo	Amarillo	300
Houston	Houston	200
Houston	Houston	200
Houston	Houston	200
UTAH		
Ogden	Ogden	300
VIRGINIA		
Alexandria	Washington, D.C.	200
Arlington	Washington, D.C.	300
Arlington	Washington, D.C.	300
Norfolk	Norfolk-Portsmouth	360
Portsmouth	Norfolk-Portsmouth	350
Roanoke	Roanoke	200
WEST VIRGINIA		
Charleston	Charleston	300
WISCONSIN		
Green Bay	Green Bay	450
Milwaukee	Milwaukee	300
Milwaukee	Milwaukee	300
Sheboygan	--	240

F.21 Steam-Electric Power Plants (Coal/Oil Fired)

The production of power by the combustion of fossil fuels is a major source of air pollution in this country. Coal and fuel oil burning contribute large quantities of particulates, sulfur oxides, and nitrogen oxides to the atmosphere. Use of natural gas as a fuel almost completely reduces emissions of particulates and sulfur oxides, but contributes nitrogen oxides. During the 30-year period 1938-1967, the total installed steam-electric generating capacity increased from 26,000 to 210,800 megawatts, and the annual net generation increased from 68.4 billion to 973.8 billion kilowatt-hours.(54) This growth pattern is expected to continue, with the resultant increase of pollutant emissions. Nuclear steam-electric plants are not expected to be a significant factor nationally for many years in reducing the total pollutant emissions.

The steam-electric power industry in 1967 had 325 plants deriving 100 megawatts or more power from the consumption of coal and/or oil(54) (see table F-36). These plants are in 39 States and the District of Columbia. Figure F-32 shows the geographical distribution of these plants; 65 percent of the sites are within SMSA's.

Particulate emissions from coal-fired units depend on the ash content of the coal, the type of combustion unit, and the control equipment used. Uncontrolled particulate emissions from oil-fired power boilers are about 1 percent of uncontrolled emissions from similar coal-fired equipment. Usual methods of particulate control for power plants are electrostatic precipitators, inertial separators, or both; these have achieved collection efficiencies in excess of 99 percent. Control equipment efficiency is indicated in table F-35.

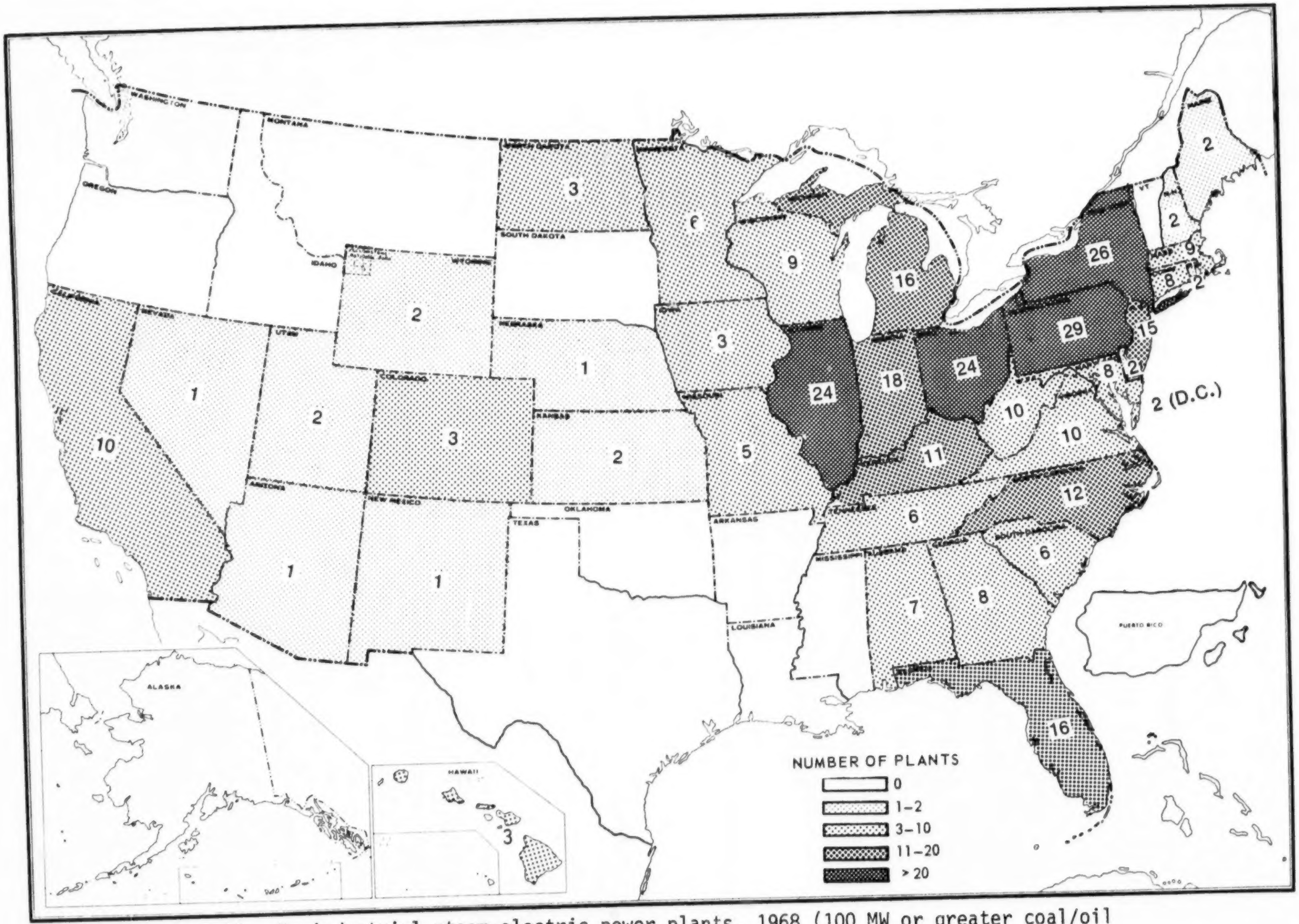
2 (D.C.)
NUMBER OF PLANTS
0
1–2
3–10
11–20
> 20
WASHINGTON
OREGON
MONTANA
IDAHO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
ARKANSAS
LOUISIANA
COLORADO
NEW MEXICO
ARIZONA
UTAH
NEVADA
CALIFORNIA
WYOMING
ALASKA
HAWAII
PUERTO RICO
VT

Figure F-32. Nonindustrial steam-electric power plants, 1968 (100 MW or greater coal/oil equivalent energy consumption).

Gaseous pollutants other than the sulfur and nitrogen oxides that are emitted in the power generation process are carbon monoxide, hydrocarbons, aldehydes, ketones, and organic carcinogens. Alterations in firing methods have recently demonstrated promise in reducing the formation of nitrogen oxides. Presently, there are no commercially available control systems for these pollutants; however, intensive research is underway, and large-scale tests are either in progress or planned for the removal of sulfur dioxide from power plant stack gases. Interim control measures include fuel substitution (i.e., natural gas), low sulfur coal and oil, and very tall stacks.

Table F-35. USUAL EXPECTED EFFICIENCY RANGES FOR COMMONLY USED CONTROL EQUIPMENT(55)

	Type of control equipment, percent efficiency			
Type of firing or furnace	Electrostatic precipitator	High efficiency cyclone	Low resistance cyclone	Settling chamber, expanded chimney bases
Cyclone	65-99	30-40	20-30	-
Pulverized	80-99+	65-75	40-60	-
Spreader stoker	-	85-90	70-80	20-30
Other stokers	-	90-95	75-85	25-50

Table F-36. STEAM-ELECTRIC POWER PLANTS--Nonindustrial
(100 MW or Greater Equivalent Energy Derived From Coal/Oil)
1968

State City (County)	SMSA	Name of Plant	Name of Utility	Inst. MW Cap.	% Energy from Coal/Oil
ALABAMA					
Bucks	Mobile	Barry	Alabama Power Co.	578	100
Demopolis	--	Greene County	Alabama Power Co.	568	100
Gorgas	Birmingham	Gorgas	Alabama Power Co.	757	100
Mobile	Mobile	Chickasaw	Alabama Power Co.	138	100
Pride	--	Colbert	Tennessee Valley Auth.	1,373	100
Stevenson	--	Widows Creek	Tennessee Valley Auth.	1,978	100
Wilsonville	Birmingham	Gaston	Southern Elect. Gen. Co.	1,061	100
ARIZONA					
Joseph City	--	Cholla	Arizona Public Serv. Co.	114	99
CALIFORNIA					
Alamito	Los Angeles-Long Beach	Alamitos	Southern Calif. Edison Co.	1,892	20
(Contra Costa)	San Francisco-Oakland	Pittsburg	Pacific Gas & Elect. Co.	1,278	11
El Segundo	Los Angeles-Long Beach	El Segundo	Southern Calif. Edison Co.	996	19
Fontana	San Bernardino-Riverside-Ontario	Etiwanda	Southern Calif. Edison Co.	911	22
Huntington Beach	Anaheim-Santa Ana-Garden Grove	Huntington Beach	Southern Calif. Edison Co.	870	14
Morro Bay	--	Morro Bay	Pacific Gas & Elect. Co.	1,056	14
Moss Landing	Salinas-Monterey	Moss Landing	Pacific Gas & Elect. Co.	1,363	22
Redondo Beach	Los Angeles-Long Beach	Redondo Beach	California Edison Co.	1,579	11
Seal Beach	Anaheim-Santa Ana-Garden Grove	Haynes	Los Angeles Dept. of Water and Power	1,606	26
Wilmington	Los Angeles-Long Beach	Harbor	Los Angeles Dept. of Water and Power	355	31

State City (County)	SMSA	Name of Plant	Name of Utility	Inst. MW Cap.	% Energy from Coal/Oil
COLORADO					
Boulder	Denver	Valmont	Public Serv. Co. of Colorado	274	87
Denver	Denver	Cherokee	Public Serv. Co. of Colorado	420	87
Hayden	--	Hayden	Colorado-Ute Elect. Assoc., Inc.	163	100
CONNECTICUT					
Bridgeport	Bridgeport-Stamford-Norwalk	Steel Point	United Illuminating Co.	146	100
Bridgeport	Bridgeport-Stamford-Norwalk	Bridgeport Harbor	United Illuminating Co.	225	100
Hartford	Hartford-New Britain	South Meadow	Hartford Elect. Lt. Co.	217	100
Middletown	--	Middletown	Hartford Elect. Lt. Co.	422	100
Milford	Bridgeport	Devon	Connecticut Lt. & Power Co.	479	100
Montville	New London-Groton-Norwich	Montville	Connecticut Lt. & Power Co.	176	100
New Haven	New Haven	English	United Illuminating Co.	135	100
Norwalk	Bridgeport-Stamford-Norwalk	Norwalk Harbor	Connecticut Lt. & Power Co.	326	100
DELAWARE					
Millsboro	--	Indian River	Delmarva Power & Lt. Co.	163	100
Wilmington	Wilmington	Edge Moor	Delmarva Power & Lt. Co.	390	93
DISTRICT OF COLUMBIA					
Washington	Washington, D.C.	Benning	Potomac Elect. Power Co.	264	100
Washington	Washington, D.C.	Buzzards Point	Potomac Elect. Power Co.	270	100
FLORIDA					
Cocoa	--	Cape Kennedy	Florida Power & Lt. Co.	402	100
Dania	Fort Lauderdale-Hollywood	Lauderdale	Florida Power & Lt. Co.	312	37

State City (County)	SMSA	Name of Plant	Name of Utility	Inst. MW Cap.	% Energy from Coal/Oil
FLORIDA (cont.)					
Florida City	Miami	Turkey Point	Florida Power & Lt. Co.	402	100
Ft. Myers	Ft. Myers	Fort Myers	Florida Power & Lt. Co.	156	100
Indian River City	--	Indian River	Orlando Util. Commis.	294	34
Jacksonville	Jacksonville	Kennedy, J. D.	City of Jacksonville	327	100
Jacksonville	Jacksonville	Northside #1	City of Jacksonville	280	100
Jacksonville	Jacksonville	Southside	City of Jacksonville	357	100
Panama City	--	Smith, Lansing	Gulf Power Co.	340	100
Pensacola	Pensacola	Crist	Gulf Power Co.	281	58
Port Everglades	Fort Lauderdale-Hollywood	Port Everglades	Florida Power & Lt. Co.	1,255	100
Red Level	--	Crystal River	Florida Power Corp.	440	100
Riviera	West Palm Beach	Riviera	Florida Power & Lt. Co.	740	68
St. Petersburg	Tampa-St. Petersburg	Bartow, P. L.	Florida Power Corp.	494	74
Tampa	Tampa-St. Petersburg	Gannon, F. J.	Tampa Electric Co.	1,270	100
Tampa	Tampa-St. Petersburg	Hooker's Point	Tampa Electric Co.	233	100
GEORGIA					
(Bibb)	Macon	Arkwright	Georgia Power Co.	181	100
Brunswick	--	McManus	Georgia Power Co.	144	100
(Cobb)	Atlanta	Atkinson	Georgia Power Co.	258	100
(Dougherty)	Albany	Mitchell, W.	Georgia Power Co.	218	100
Milledgeville	--	Branch Harllee	Georgia Power Co.	658	100
Rome	--	Hammond	Georgia Power Co.	375	100
Smyrna	Atlanta	McDonough, Jack	Georgia Power Co.	598	100
Whitesburg	--	Yates	Georgia Power Co.	680	100

State City (County)	SMSA	Name of Plant	Name of Utility	Inst. MW Cap.	% Energy from Coal/Oil
HAWAII					
Honolulu	Honolulu	Honolulu-Hicks	Hawaiian Electric Co., Ltd.	208	100
Honolulu	Honolulu	Kahe	Hawaiian Electric Co., Ltd.	163	100
Honolulu	Honolulu	Waiau	Hawaiian Electric Co., Ltd.	313	100
ILLINOIS					
Bartonville	Peoria	Edwards, E.D.	Central Illinois Light Co.	125	100
Chicago	Chicago	Crawford	Commonwealth Edison Co.	701	85
Chicago	Chicago	Calumet	Commonwealth Edison Co.	234	71
Chicago	Chicago	Fisk	Commonwealth Edison Co.	602	90
Chicago	Chicago	Northwest	Commonwealth Edison Co.	224	100
Coffeen	--	Coffeen	Central Ill. Public Serv. Co.	330	100
East Peoria	Peoria	Wallace, R.S.	Central Illinois Light Co.	301	99
East St. Louis	St. Louis	Venice No. 2	Union Electric Co.	500	88
Grand Tower	--	Grand Tower	Central Ill. Public Serv. Co.	216	100
Havana	--	Havana	Illinois Power Co.	230	100
Hennepin	--	Hennepin	Illinois Power Co.	306	89
Hutsonville	--	Hutsonville	Central Ill. Public Serv. Co.	200	100
Joliet	Chicago	Joliet	Commonwealth Edison Co.	1,862	100
Joppa	--	Joppa	Electric Energy, Inc.	1,100	100
Kincaid	--	Kincaid	Commonwealth Edison Co.	660	100
Lockport	Chicago	Will County	Commonwealth Edison Co.	1,269	100
Meredosia	--	Meredosia	Central Ill. Public Serv. Co.	325	100
Monsanto	St. Louis	Cahokia	Union Electric Co.	300	100
Oakwood	--	Vermillion	Illinois Power Co.	182	100
Pekin	Peoria	Powerton	Commonwealth Edison Co.	320	100

State City (County)	SMSA	Name of Plant	Name of Utility	Inst. MW Cap.	% Energy from Coal/Oil
ILLINOIS (cont.)					
Springfield	Springfield	Lakeside	Springfield Water, Light, & Power Dept.	146	100
Stickney	Chicago	Ridgeland	Commonwealth Edison Co.	690	71
Waukegan	Chicago	Waukegan	Commonwealth Edison Co.	1,043	87
Wood River	St. Louis	Wood River	Illinois Power Co.	650	100
INDIANA					
Centertown	Indianapolis	Prichard, H.T.	Indianapolis Power & Lt. Co.	396	100
Dune Acres	Gary-Hammond-East Chicago	Bailly	Northern Indiana Public Service Co.	194	81
Edwardsport	Louisville	Edwardsport	Public Service Co. of Indiana, Inc.	133	100
Evansville	Evansville	Ohio River	Southern Indiana Gas & Electric Co.	112	100
Gary	Gary-Hammond-East Chicago	Mitchell, Dean	Northern Indiana Public Service Co.	414	93
Hammond	Gary-Hammond-East Chicago	State Line	Commonwealth Edison Co. of Indiana, Inc.	972	83
Indianapolis	Indianapolis	Stout, E.W.	Indianapolis Power & Lt. Co.	384	100
Lawrenceburg	Cincinnati	Tanners Creek	Indiana-Michigan Elect. Co.	1,098	100
Madison	--	Clifty Creek	Indiana-Kentucky Elect. Corp.	1,304	100
Michigan City	--	Michigan City	Northern Indiana Public Service Co.	215	81
Mishawaka	South Bend	Twin Branch	Indiana-Michigan Elect. Co.	394	100
New Albany	Louisville	Gallagher	Public Service Co. of Indiana, Inc.	600	100
Newburg	Evansville	Culley, F.B.	Southern Indiana Gas & Electric Co.	136	100

State City (County)	SMSA	Name of Plant	Name of Utility	Inst. MW Cap.	% Energy from Coal/Oil
INDIANA (cont.)					
Noblesville	Indianapolis	Louisville	Public Service Co. of Indiana, Inc.	100	100
Petersburg	--	Petersburg	Indianapolis Power & Lt. Co.	262	100
Sullivan	--	Breed	Indiana-Michigan Elect. Co.	450	100
Terre Haute	Terre Haute	Dresser	Public Service Co. of Indiana, Inc.	221	100
Terre Haute	Terre Haute	Wabash River	Public Service Co. of Indiana, Inc.	521	100
IOWA					
Clinton	--	Milton L. Kapp	Interstate Power Co.	237	83
Des Moines	Des Moines	Des Moines No. 2	Iowa Power & Light Co.	325	37
Iowanna	Davenport-Rock Island-Moline	Riverside	Iowa-Illinois Gas & Electric Co.	244	43
KANSAS					
Kansas City	Kansas City	Quindaro No. 2, & No. 3	Kansas City Bd. of Public Utilities	186	50
Parsons	--	Neosho	Kansas City Bd. of Public Utilities	113	-
KENTUCKY					
Burgin	--	Brown, E.M.	Kentucky Utilities Co.	293	100
Burnside	--	Cooper	East Kentucky Rural Electric Co-op.	114	100
Drakesboro	--	Paradise	Tennessee Valley Auth.	1,408	100
Ford	--	Dale	East Kentucky Rural Electric Co-op.	196	100
Louisa	Huntington-Ashland	Big Sandy	Kentucky Power Co.	265	100

State City (County)	SMSA	Name of Plant	Name of Utility	Inst. MW Cap.	% Energy from Coal/Oil
KENTUCKY (cont.)					
Louisville	Louisville	Cane Run	Louisville Gas & Elect. Co.	745	99
Louisville	Louisville	Paddy's Run	Louisville Gas & Elect. Co.	337	100
Owensboro	--	Elmer Smith	Owensboro Municipal Util.	151	100
Paducah	--	Shawnee	Tennessee Valley Auth.	1,725	100
So. Carrollton	--	Green River	Kentucky Utilities Co.	264	100
Tyrone	--	Tyrone	Kentucky Utilities Co.	137	100
MAINE					
Wiscassett	--	Mason	Central Maine Power Co.	146	100
Yarmouth	Portland	Wyman, Walter F.	Central Maine Power Co.	214	100
MARYLAND					
Baltimore	Baltimore	Crane, Chas. P.	Baltimore Gas & Elect. Co.	400	100
Baltimore	Baltimore	Gould Street	Baltimore Gas & Elect. Co.	173	99
Baltimore	Baltimore	Riverside	Baltimore Gas & Elect. Co.	333	100
Baltimore	Baltimore	Westport	Baltimore Gas & Elect. Co.	311	100
Chalk Point	Baltimore	Chalk Point	Potomac Elect. Power Co.	728	100
Dickerson	Washington, D.C.	Dickerson	Potomac Elect. Power Co.	586	100
Hawkins Point	Baltimore	Wagner, H.A.	Baltimore Gas & Elect. Co.	628	100
Williamsport	--	Smith, R. Paul	The Potomac Edison Co.	160	100
MASSACHUSETTS					
Everett	Boston	Mystic Sec. Nos. I-II	Boston Edison Co.	619	100
Holyoke	Springfield-Chicopee-Holyoke	Mount Tom	Holyoke Water Power Co.	136	100
North Weymouth	Boston	Edgar, Sec. Nos. I-II	Boston Edison Co.	458	99

State City (County)	SMSA	Name of Plant	Name of Utility	Inst. MW Cap.	% Energy from Coal/Oil
MASSACHUSETTS (cont.)					
Salem	--	Salem Harbor	New England Power Co.	320	100
Somerset	Fall River	Somerset	Montaup Electric Co.	329	100
Somerset	Fall River	Brayton Point	New England Power Co.	482	100
South Boston	Boston	"L" Street	Boston Edison Co.	169	100
South Boston	Boston	New Boston	Boston Edison Co.	718	100
West Springfield	Springfield-Chicopee-Holyoke	W. Springfield	Western Massachusetts Electric Co.	210	100
MICHIGAN					
Comstock	Kalamazoo	Morrow, B.E.	Consumers Power Co.	186	100
Detroit	Detroit	Conners Creek	The Detroit Edison Co.	585	100
Detroit	Detroit	Delray No. 3	The Detroit Edison Co.	375	100
Detroit	Detroit	Mistersky	Detroit Public Lighting Commission	174	100
East China Twp.	--	St. Clair	The Detroit Edison Co.	1,360	100
Erie	Toledo	Whiting, J.R.	Consumers Power Co.	325	100
Essexville	Bay City	Karn, Dan E.	Consumers Power Co.	530	100
Essexville	Bay City	Weadock, J. Co.	Consumers Power Co.	614	100
Lansing	Lansing	Eckert, O. E. (Moores Park)	Lansing Bd. of Water & Lt.	221	100
Marquette	--	Presque Isle	Upper Peninsula Generating Co.	175	100
Marysville	--	Marysville	The Detroit Edison Co.	300	100
Muskegon	Muskegon-Muskegon Heights	Cobb, B.C.	Consumers Power Co.	510	100
River Rouge	Detroit	River Rouge	The Detroit Edison Co.	933	100
Trenton	Detroit	Trenton Channel	The Detroit Edison Co.	540	100

State City (County)	SMSA	Name of Plant	Name of Utility	Inst. MW Cap.	% Energy from Coal/Oil
MICHIGAN (cont.)					
West Olive	--	Campbell, J.H.	Consumers Power Co.	650	100
Zilwaukee	Saginaw	Saginaw River	Consumers Power Co.	140	100
MINNESOTA					
Aurora	Duluth-Superior	Aurora	Minnesota Power & Lt. Co.	116	100
Cohasset	--	Boswell, Clay	Minnesota Power & Lt. Co.	150	100
Fergus Falls	--	Hoot Lake	Otter Tail Power Co.	137	100
Minneapolis	Minneapolis-St. Paul	Riverside	Northern States Power Co. (Minnesota)	518	75
Minneapolis	Minneapolis-St. Paul	Black Dog	Northern States Power Co. (Minnesota)	487	57
St. Paul	Minneapolis-St. Paul	High Bridge	Northern States Power Co. (Minnesota)	464	49
MISSOURI					
Montrose	--	Montrose	Kansas City Power & Lt. Co.	563	100
(Randolph)	--	Thomas Hill	Associated Electric Corp.	175	100
(St. Louis)	St. Louis	Meramec	Union Electric Co.	923	94
Sibley	Kansas City	Sibley	Missouri Public Serv. Co.	100	100
West Alton	St. Louis	Sioux	Union Electric Co.	550	100
NEBRASKA					
Omaha	Omaha	North Omaha	Omaha Public Power Dist.	400	34
NEVADA					
Moapa	Las Vegas	Reid Gardner	Nevada Power Co.	114	100

State City (County)	SMSA	Name of Plant	Name of Utility	Inst. MW Cap.	% Energy from Coal/Oil
NEW HAMPSHIRE					
Bow	--	Merrimack	Public Service Co. of New Hampshire	114	100
Portsmouth	--	Schiller	Public Service Co. of New Hampshire	194	100
NEW JERSEY					
Beesley's Point	--	England, B.L.	Atlantic City Elect. Co.	299	100
Burlington	Philadelphia	Burlington	Public Service Elect. & Gas Co.	503	100
Hamilton Twp.	Trenton	Mercer	Public Service Elect. & Gas Co.	653	88
Holland	--	Gilbert	New Jersey Power & Lt. Co.	126	100
Jersey City	Jersey City	Hudson	Public Service Elect. & Gas Co.	455	100
Jersey City	Jersey City	Marion	Public Service Elect. & Gas Co.	125	100
Kearny	Jersey City	Kearney "A"	Public Service Elect. & Gas Co.	305	100
Kearny	Jersey City	Kearney "B"	Public Service Elect. & Gas Co.	305	100
Linden	Newark	Linden	Public Service Elect. & Gas Co.	519	100
Newark	Newark	Essex	Public Service Elect. & Gas Co.	328	88
Penns Grove	Wilmington	Deepwater	Atlantic City Elect. Co.	308	100
Ridgefield	Paterson-Clifton-Passaic	Bergen	Public Service Elect. & Gas. Co.	650	76
Sayreville	--	Sayreville	Jersey Central Power & Light Co.	344	84

State City (County)	SMSA	Name of Plant	Name of Utility	Inst. MW Cap.	% Energy from Coal/Oil
NEW JERSEY (cont.)					
Sewaren	--	Sewaren	Public Service Elect. & Gas Co.	841	92
South Amboy	--	Werner, E.H.	Jersey Central Power & Light Co.	116	100
NEW MEXICO					
Shiprock	--	Four Corners	Arizona Public Serv. Co.	634	100
NEW YORK					
Astoria	New York	Astoria	Consolidated Edison Co. of N.Y., Inc.	1,551	79
Bethlehem	Albany-Schenectady-Troy	Albany	Niagara Mohawk Power Corp.	400	100
Dunkirk	--	Dunkirk	Niagara Mohawk Power Corp.	628	100
Far Rockaway	New York	Far Rockaway	Long Island Lighting Co.	121	94
Glenwood Landing	New York	Glenwood	Long Island Lighting Co.	400	70
Greece	Rochester	Rochester No. 7	Rochester Gas & Elect. Corp.	253	100
Island Park	New York	Barrett, E.F.	Long Island Lighting Co.	375	90
Lansing	--	Milliken	New York State Electric & Gas Corp.	270	100
Long Island	New York	Ravenswood	Consolidated Edison Co. of N.Y., Inc.	1,828	72
New York	New York	East River	Consolidated Edison Co. of N.Y., Inc.	834	83
New York	New York	59th Street	Consolidated Edison Co. of N.Y., Inc.	149	100
New York	New York	Hell Gate	Consolidated Edison Co. of N.Y., Inc.	611	73
New York	New York	Hudson Avenue	Consolidated Edison Co. of N.Y., Inc.	845	100

State City (County)	SMSA	Name of Plant	Name of Utility	Inst. MW Cap.	% Energy from Coal/Oil
NEW YORK (cont.)					
New York	New York	74th Street	Consolidated Edison Co. of N.Y., Inc.	269	100
New York	New York	Sherman Creek	Consolidated Edison Co. of N.Y., Inc.	216	96
New York	New York	Waterside	Consolidated Edison Co. of N.Y., Inc.	712	32
Northport	New York	Northport	Long Island Lighting Co.	387	100
Oswego	Syracuse	Oswego	Niagara Mohawk Power Corp.	376	100
Port Jefferson	New York	Port Jefferson	Long Island Lighting Co.	467	100
Rochester	Rochester	Rochester No. 3	Rochester Gas & Elect. Corp.	206	100
Roseton	--	Danskammer	Central Hudson Gas & Electric Corp.	532	97
Staten Island	New York	Arthur Kill	Consolidated Edison Co. of N.Y., Inc.	376	100
Tompkins Cove	--	Lovett	Orange & Rockland Utilities, Inc.	294	63
Tonawanda	Buffalo	Huntley, C.R.	Niagara Mohawk Power Corp.	828	100
Torry	--	Greenidge	New York State Electric & Gas Corp.	160	100
Union	Binghamton	Goudey	New York State Electric & Gas Corp.	146	100
NORTH CAROLINA					
Asheville	Asheville	Skyland	Carolina Power & Lt. Co.	206	100
Belmont	--	Allen, G.G.	Duke Power Co.	1,155	100
Cliffside	--	Cliffside	Duke Power Co.	210	100
Draper	--	Dan River	Duke Power Co.	290	100
Goldsboro	--	Lee, H.F.	Carolina Power & Lt. Co.	402	100

State City (County)	SMSA	Name of Plant	Name of Utility	Inst. MW Cap.	% Energy from Coal/Oil
NORTH CAROLINA (cont.)					
Lumberton	--	Weatherspoon, W.H.	Carolina Power & Lt. Co.	165	81
Moncure	--	Cape Fear	Carolina Power & Lt. Co.	421	100
Mt. Holly	--	Riverbend	Duke Power Co.	631	100
Roxboro	--	Roxboro	Carolina Power & Lt. Co.	411	100
Spencer	--	Buck	Duke Power Co.	443	100
Terrell	--	Marshall	Duke Power Co.	700	100
Wilmington	Wilmington	Sutton, L.V.	Carolina Power & Lt. Co.	225	99
NORTH DAKOTA					
Mandan	--	Heskett	Montana-Dakota Util. Co.	100	100
Stanton	--	Leland Olds	Basin Electric Power Co-op.	216	100
Stanton	--	Stanton	United Power Assoc.	172	100
OHIO					
Ashtabula	--	Ashtabula	The Cleveland Electric Illuminating Co.	456	100
Athens	--	Poston	Columbus & Southern Ohio Electric Co.	232	100
Avon Lake	Lorain-Elyria	Avon	The Cleveland Electric Illuminating Co.	595	100
Beverly	--	Muskingum	Ohio Power Co.	876	100
Brilliant	Steubenville-Weirton	Tidd	Ohio Power Co.	222	100
Brilliant	Steubenville-Weirton	Cardinal	Ohio Power Co.	1,180	100
Cheshire	Columbus	Kyger Creek	Ohio Valley Elect. Corp.	1,086	100
Cincinnati	Cincinnati	West End	The Cincinnati Gas & Electric Co.	219	84
Cleveland	Cleveland	Lake Shore	The Cleveland Electric Illuminating Co.	518	100

State City (County)	SMSA	Name of Plant	Name of Utility	Inst. MW Cap.	% Energy from Coal/Oil
OHIO (cont.)					
Columbus	Columbus	Picway	Columbus & Southern Ohio Electric Co.	231	100
Conesville	--	Conesville	Columbus & Southern Ohio Electric Co.	433	100
Dayton	Dayton	Tait, Frank M.	The Dayton Power & Lt. Co.	444	100
Dilles Bottom	Wheeling	Burger, R.E.	Ohio Edison Co.	544	100
Eastlake	Cleveland	Eastlake	The Cleveland Electric Illuminating Co.	577	100
Lorain	Lorain-Elyria	Edgewater	Ohio Edison Co.	193	100
New Richmond	Cincinnati	Beckjord, W.C.	The Cincinnati Gas & Electric Co.	760	100
Niles	Youngstown-Warren	Niles	Ohio Edison Co.	250	100
North Bend	Cincinnati	Miami Fort	The Cincinnati Gas & Electric Co.	519	100
Oregon	Toledo	Bayshore	Toledo Edison Co.	422	100
Philo	--	Philo	Ohio Power Co.	500	100
S. Dayton	Dayton	Hutchings, O.H.	The Dayton Power & Lt. Co.	414	100
Stratton	Steubenville-Weirton	Sammis, W.H.	Ohio Edison Co.	1,057	100
Toledo	Toledo	Acme	Toledo Edison Co.	337	88
Toronto	Steubenville-Weirton	Toronto	Ohio Edison Co.	316	100
PENNSYLVANIA					
Brunot Island	Pittsburgh	Reed, James H.	Duquesne Light Co.	180	100
Chester	Philadelphia	Chester	Philadelphia Elect. Co.	256	100
Courtney	Pittsburgh	Mitchell	West Penn Power Co.	449	100
E. Pikeland	Philadelphia	Cromby	Philadelphia Elect. Co.	417	100
Eddystone	Philadelphia	Eddystone	Philadelphia Elect. Co.	707	100

State City (County)	SMSA	Name of Plant	Name of Utility	Inst. MW Cap.	% Energy from Coal/Oil
PENNSYLVANIA (cont.)					
Elrama	Pittsburgh	Elrama	Duquesne Light Co.	425	100
Erie	Erie	Front Street	Pennsylvania Electric Co.	119	100
Hauto	--	Hauto	Pennsylvania Power & Lt. Co.	106	100
Holtwood	Lancaster	Holtwood	Pennsylvania Power & Lt. Co.	105	100
Martins Creek	--	Martins Creek	Pennsylvania Power & Lt. Co.	312	100
Middletown	Harrisburg	Crawford	Metropolitan-Edison Co.	117	100
Philadelphia	Philadelphia	Delaware	Philadelphia Elect. Co.	499	100
Philadelphia	Philadelphia	Richmond	Philadelphia Elect. Co.	475	100
Philadelphia	Philadelphia	Schuylkill	Philadelphia Elect. Co.	325	100
Philadelphia	Philadelphia	Southwark	Philadelphia Elect. Co.	345	100
Pittston	Wilkes-Barre-Hazleton	Stanton	Pennsylvania Power & Lt. Co.	146	100
Portland	Allentown-Bethlehem-Easton	Portland	Metropolitan-Edison Co.	394	100
Reading	Reading	Titus	Metropolitan-Edison Co.	225	100
Reesdale	--	Armstrong	West Penn Power Co.	326	100
Seward	Pittsburgh	Seward	Pennsylvania Electric Co.	268	100
Shawville	--	Shawville	Pennsylvania Electric Co.	640	100
Shelocta	--	Keystone	Pennsylvania Power & Lt. Co.	936	100
So. Heights	Pittsburgh	Phillips, F.R.	Duquesne Light Co.	315	100
Springdale	Pittsburgh	Colfax	Duquesne Light Co.	262	100
Springdale	Pittsburgh	Springdale	West Penn Power Co.	422	100
Sunbury	--	Sunbury	Pennsylvania Power & Lt. Co.	410	100
West Norriton	Philadelphia	Barbadoes	Philadelphia Elect. Co.	180	87
West Pittsburgh	--	New Castle	Pennsylvania Power Co.	426	100
York Haven	York	Brunner Island	Pennsylvania Power & Lt. Co.	768	100

State City (County)	SMSA	Name of Plant	Name of Utility	Inst. MW Cap.	% Energy from Coal/Oil
RHODE ISLAND					
Providence	Providence-Pawtucket-Warwick	Manchester Street	The Narragansett Elect. Co.	132	100
Providence	Providence-Pawtucket-Warwick	South Street	The Narragansett Elect. Co.	189	100
SOUTH CAROLINA					
Beech Island	Augusta	Urquhart	South Carolina Elect. & Gas Co.	250	75
Canadys	--	Canadys	South Carolina Elect. & Gas Co.	490	91
Conway	--	Grainger	South Carolina Public Service Authority	150	100
Hartsville	--	Robinson, H.B.	Carolina Power & Lt. Co.	207	100
Irmo	Columbia	McMeekin, Silas	South Carolina Elect. & Gas Co.	294	53
Pelzer	--	Lee, W.S.	Duke Power Co.	345	100
TENNESSEE					
Gallatin	--	Gallatin	Tennessee Valley Auth.	1,255	100
Johnsonville	--	Johnsonville	Tennessee Valley Auth.	1,485	100
Kingston	--	Kingston	Tennessee Valley Auth.	1,700	100
Memphis	Memphis	Allen, Thomas H.	Tennessee Valley Auth.	990	44
Oak Ridge	Knoxville	Bull Run	Tennessee Valley Auth.	950	100
Rogersville	--	Sevier, John	Tennessee Valley Auth.	823	100
UTAH					
Castle Gate	--	Carbon County, Sec. Nos. 1-2	Utah Power and Light	189	100
Salt Lake City	Salt Lake City	Gadsby-Secs. Nos. 1-3	Utah Power and Light	252	41

State City (County)	SMSA	Name of Plant	Name of Utility	Inst. MW Cap.	% Energy from Coal/Oil
VIRGINIA					
Alexandria	Washington, D.C.	Potomac River	Potomac Electric Power Co.	515	100
Bremo Bluff	--	Bremo	Virginia Elect. & Power Co.	284	100
Carbo	--	Clinch River	Appalachian Power Co.	669	100
Dumfries	Washington, D.C.	Possum Point	Virginia Elect. & Power Co.	491	100
Glen Lyn	--	Glen Lyn	Appalachian Power Co.	401	100
Norfolk	Norfolk-Portsmouth	Reeves Avenue	Virginia Elect. & Power Co.	100	100
N. Chesterfield	Richmond	Chesterfield	Virginia Elect. & Power Co.	790	100
Portsmouth	Norfolk-Portsmouth	Portsmouth	Virginia Elect. & Power Co.	650	100
Richmond	Richmond	Twelfth Street	Virginia Elect. & Power Co.	103	100
Yorktown	Newport News-Hampton	Yorktown	Virginia Elect. & Power Co.	375	100
WEST VIRGINIA					
Albright	--	Albright	Monongahela Power Co.	209	100
Cabin Creek	Charleston	Cabin Creek	Appalachian Power Co.	273	99
Captina	Wheeling	Kammer	Ohio Power Co.	675	100
Glascow	Charleston	Kanawha River	Appalachian Power Co.	426	100
Graham	--	Sporn, Philip	Appalachian Power Co.	1,060	100
Morgantown	--	Fort Martin	Monongahela Power Co.	576	100
Mt. Storm	--	Mount Storm	Virginia Elect. & Power Co.	1,140	100
Power	Steubenville-Weirton	Windsor	Beech Bottom Power Co., Inc.	300	100
Rivesville	--	Rivesville	Monongahela Power Co.	175	98
St. Mary's	--	Willow Island	Monongahela Power Co.	215	100
WISCONSIN					
Alma	--	Alma	Dairyland Power Co-op.	188	100

State City (County)	SMSA	Name of Plant	Name of Utility	Inst. MW Cap.	% Energy from Coal/Oil
WISCONSIN (cont.)					
Beloit	--	Rock River	Wisconsin Power & Lt. Co.	159	100
Cassville	--	Dewey Nelson	Wisconsin Power & Lt. Co.	227	100
Oak Creek	Milwaukee	South Oak Creek	Wisconsin Elect. Power Co.	1,170	100
Oak Creek	Milwaukee	North Oak Creek	Wisconsin Elect. Power Co.	500	100
Port Washington	Milwaukee	Port Washington	Wisconsin Elect. Power Co.	400	100
Rothchild	--	Pulliam	Wisconsin Public Service Corp.	392	100
St. Francis	Milwaukee	Lakeside	Wisconsin Elect. Power Co.	311	100
Sheboygan	--	Edgewater	Wisconsin Power & Lt. Co.	129	100
WYOMING					
Glenrock	--	Johnston, Dave	Pacific Power & Light Co.	420	100
Kemmerer	--	Naughton	Utah Power & Light Co.	163	100

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